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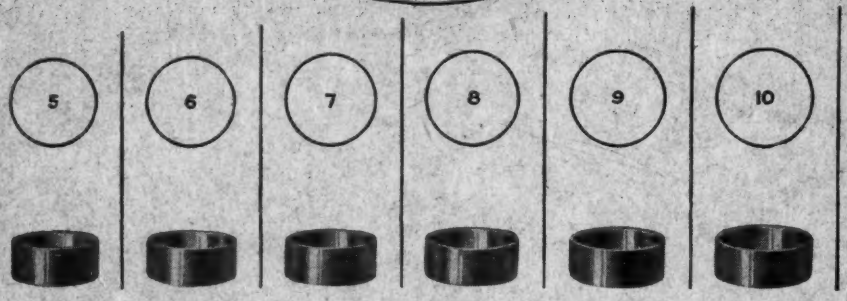

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VOL. XIV ST. LOUIS, APRIL, 1928 No. 4

ORIGINAL ARTICLES

PRESIDENT'S ADDRESS*

BY DR. WILLIAM T. CHAPMAN, EL PASO, TEXAS

IT IS my esteemed privilege to extend a most cordial welcome to our guests and to greet the members of this organization with a sincere expression of my appreciation for having been given the opportunity to serve as president of the Southwestern Society of Orthodontists for the past year. I assure you this is an honor upon which I shall look back during the succeeding years with many pleasant memories.

It might be of interest to our new members and visitors to mention at this time just how the organization of this Society came about. Most of the credit for this is due our friend and fellow member, Dr. T. O. Gorman, of San Antonio, who first conceived the idea that there were men enough in the Southwest who were specializing in orthodontia to organize a Society, where we could exchange ideas, discuss our problems and promote good fellowship among the orthodontists of the Southwest. In April, 1920, five of the Texas men met in Dallas during the State Dental meeting and plans were made for the organization. After much correspondence on the part of Drs. Gorman and Duckworth, the orthodontists of Texas and Oklahoma agreed to meet in Dallas in April, 1921, they having in the meantime engaged our good friend Dr. Ketcham of Denver to lecture to us on the various subjects pertaining to orthodontia and help us with the final organization of this Society. Dr. Gorman was elected our first president.

Since then there have been annual meetings held in different cities in Oklahoma and Texas, studying the various phases of orthodontia, according to the rapid progress of our specialty. Members have been added from Kansas, southern Missouri, Arkansas and western Louisiana until our membership now consists of approximately fifty active members. I would suggest at this time that we active members be not such members in name only. Each one of us has a duty to perform. This is our Society and we as members are duty bound to make it a success. Of course we have other societies

*Read before the Southwestern Society of Orthodontists, El Paso, Texas, December 5-8, 1927.

to which we are closely attached, but those of us who are practicing in the Southwest have not the opportunities of those living in the more densely populated districts. Therefore we should make a special effort to attend these meetings and work together as a great southwestern unit for better orthodontia.

For better orthodontia we must lay aside all petty jealousies in our professional lives, if such exist in this Society, and save our energies for study and advancement; and honest difference of opinion, to which we are all entitled, should be no cause for ignoble enmities. Success is to be measured as much in our service to mankind as in material gain. The matter of fees to be charged can safely be left to the discretion of most conscientious operators, for the man who renders the best service possible is usually honest with both patient and himself. On the other hand, the obtaining of enormous fees for poor services or those of little value should be condemned, for the reaction upon the rest of the profession is harmful. We should not be too hasty in putting appliances on our patients simply because we need the so-called appliance fee, for such haste has been responsible for much grief and many of our failures. Our patients should have a more thorough examination than many of us have been giving them in the past. I do not mean by that just a thorough study of models and photographs, but full mouth x-rays of every case should be taken as has been suggested by Dr. Ketcham for several years past. Those of you who are neglecting this important part of an examination are not doing your duty to your patient or yourself. You will be surprised at the abnormal conditions such as short-rooted teeth and root resorptions of permanent teeth that the x-ray reveals.

We must consider the influence of improper diet, lack of proper exercise, fresh air and sunshine, and abnormal function of the ductless glands and many other systemic conditions as etiologic factors in developing malocclusion. Dr. Howard of Atlanta, in a paper before the American Society of Orthodontists, recently said: "The time has come when orthodontic examination can no longer be confined to that small area between the nose and chin. Medicine does not countenance any particular field of study whose vision extends no farther than a local area of the human organism." This Society stands for the best teachings and principles in orthodontia, and aims to give its members opportunities to become as proficient as any orthodontist in the country. I feel sure that you who have come so far will be well repaid by new knowledge gained in orthodontia by your presence here, as we are very fortunate in having Dr. Martin Dewey with us again. Dr. Dewey is a recognized authority in orthodontia in all countries where it is practiced. He is a hard and willing worker and never fails to leave with us new and progressive ideas in helping to solve the difficult problems in our specialty.

Heretofore our Society has held its meetings in the spring with the exception of last year when it was held in August. I wish to recommend at this time that we get back to our regular meeting time, as it seems to be more convenient to the majority of the members. In conclusion, I wish to express my appreciation of the cooperation of our board of censors and especially do I wish to commend our secretary, Dr. P. G. Spencer, for his persistent, patient, and tireless efforts in behalf of this Society.

ORTHODONTIA IN CLEFT PALATE CASES*

By H. L. D. Kirkham, M.D., Houston, Texas

SINCE the truest characteristics of ignorance are vanity, pride, arrogance, and egotism, it would seem the height of all these for one not practicing or even versed in the fundamentals of a science, to even discourse upon it, much less to attempt such to so learned a body as this, possessing as it does an intricate and detailed knowledge, leaving little to be added to its sum total.

It is not my purpose to add any knowledge of orthodontia to that already existing, but rather to point out some of those causative factors of the conditions met with, and to be coped with in cleft palate cases. Too often we each make our own observations and deductions and cannot see the other side. As Dr. Pollock has said, "Those who make the shoe do not feel it pinch, and those who feel it pinch do not know how shoes are made." So, too, with orthodontists and oral surgeons, those who repair a palate often do not know, care or think of the problems to be met with by the orthodontists in these cases; vice versa, the orthodontists often do not know, care, or think of the reasons for and what factors have produced the problems they have to solve. It is along this middle road, where too infrequently we care to tread, that I wish to try and throw a little light, which with the aid of the light you will throw from the opposite side, may tend to make our ways easier to travel, in caring for these distressing cases of cleft palate.

Since the alveolar arch is of such vital interest to the orthodontist and is the keystone to correct occlusion in normal palates, and is likewise the keystone to a correct reconstruction of a cleft palate, it might be well to consider for a moment some aspects of growth and development of the normal arch and jaw.

In an effort to determine the mechanism of palate clefts, and of their anatomic variations from normal, measurements were made of apparently normal palates at various ages ranging from birth to eight years, these being the ages between which we are most often brought in contact with palate cases. The result of these measurements reveals the fact that, as the jaw develops by a forward growth along the vomer to make room for the downward growth of bone to accommodate the molars, there is a constant relationship between the measurements taken between the hamular processes and the posterior palatine foramina, but there is a marked decrease as age advances of the distance between the posterior palatine foramina and the tuberosity of the jaw. These facts are of great importance in the preservation of blood supply in the operative treatment of cleft palate, but are only of academic interest to you as orthodontists; yet it is necessary to bring this out in connection with normal growth to show by comparison what a differ-

*Read before the Southwestern Society of Orthodontists, El Paso, Texas, December 5-8, 1927.

ent state of affairs exists in cases of cleft palate, due to allowance being made for variations in an otherwise normal jaw.

The most striking features met with in a cleft palate are that the hamular process and palatine foramen measurements still bear a constant relationship to one another, anteroposteriorly, but that both are markedly increased in distance from each other laterally, when compared to the tuberosity measurements which remain about the same as in the normal palate. What could be surmised as an explanation of this? Either that primarily cleft palate is an overgrowth or overdevelopment laterally in the sphenoid, more especially its pterygoid plates which produces a cleft posteriorly that pivots on the tuberosities thereby leaving the tuberosities as the fixed point, or that as that part of the process for the accommodation of the last molars grown downward, it also grows more mesially, which may be due to an absence of the expanding bony arch of hard palate. Again, these theories are only academic; yet the fact remains that the tuberosities of cleft palate cases are usually normal unless the cleft be unusually wide; at all events the increase in width is not in proportion to the cleft width as in the case of the posterior foramina and hamular process. The result of this is that tooth occlusion in the molar region is comparatively normal, not from an orthodontic viewpoint but when the cleft is considered. This being true, where then do we find our largest numbers of malocclusion in these cases? The answer is, in the region of the incisors, more especially the lateral; this applies not alone to cases of complete cleft but also to clefts of the soft palate with the alveolar border intact. The factors causing this lead us to the question of the development of the premaxilla and the relationship the lateral incisors bear to the gap in palate cases.

It has been common teaching that the premaxilla growing down from the frontonasal process bears the four incisors; observations have shown that this latter is very rarely the case. Cases of complete double cleft palate afford an excellent opportunity to study this phase of the question, and it has been found that the premaxilla usually bears the two central incisors and that the lateral incisors may be developed from either side of the cleft; more frequently they develop from the maxillary side and occasionally they may be split with a lateral on either side of the cleft, giving rise to a supernumerary lateral.

We are now brought to the question of irregular dentition in cleft palate cases. In an abnormally developed jaw it is only natural that there should be a larger number of irregularities of dentition in palate cases than in the normal jaw. These irregularities are seen as supernumerary teeth, absence of teeth and malpositions of otherwise normal teeth. Supernumerary teeth are more often seen in the incisor and canine regions, though at times almost complete double sets are encountered. Most commonly these supernumerary teeth are found on the lingual border coming through the horizontal plate of the hard palate; at times they are found buccally and sometimes even actually in the nostril. These teeth are usually well formed, but sometimes, though of normal size and shape, they are soft and of the consistency and appearance of a bud. When teeth are absent, unless the buds have been interfered with

during operative correction, it is usually in the region of the lateral incisors. The misplaced otherwise normal teeth may occur anywhere but also are more commonly found in the lateral incisor region. The opponents of any operation for a cleft palate which penetrates the jaw for the passage of wires or sutures, attribute faulty dentition to this operative interference; yet we sometimes find the worst cases of faulty dentition in those that have had no such interference, or for that matter no operative treatment of any kind. It cannot be denied that penetration of the jaw is not desirable, yet it does not cause as much damage as might be supposed. In other words, the faulty dentition seen in these cases is more the result of the actual congenital deformity than it is to operative interference and damage; as an illustration, the incisors in palate cases are invariably distorted and decayed and in the most severe penetrating operative cases the incisors are not and cannot be touched.

Aside from faulty dentition the arch in palate cases is distorted to a greater or less degree primarily according to the type of palate cleft, and secondarily to the type of operation performed. The primary deformity before operation is performed depends upon palate type. These cases have been variously classified, some of which classifications are good, some bad and some indifferent. Since the alveolar border is the surgical and orthodontic keystone, it is used as a means of grouping these cases, namely, as: (1) prealveolar; (2) postalveolar; (3) alveolar; known respectively as Groups 1, 2 and 3. Group 3 (alveolar clefts) is the one which concerns you most as orthodontists; therefore, it will not be necessary to enter into a discussion of types of the other groups. Cases in this group may be either unilateral or bilateral and usually have a cleft lip associated, though occasionally they do not. The extremely rare median clefts need not be consideerd. In the unilateral types we find the cleft about the site of the lateral incisor with a protrusion forward of the long side of the arch, to which is usually attached the nasal septum, which is pushed more or less horizontally; at times, however, we find the septum detached and the cleft has the appearance of trying to be of a bilateral type. In the bilateral clefts we find the premaxilla pushed far out in front of the lateral portion of the maxilla and the extended vomer and nasal septum lying in front of the cleft. The problem then to reconstruct the alveolar arch varies with the particular type of palate with which we are dealing. In the unilateral type the long side of the cleft must be swung into apposition with the short side without flattening in front. In the bilateral type the vomer must be shortened just enough to bring the premaxilla back in place without flattening the arch or tipping it in, for this latter always changes the direction of growth of the central incisors, and a flattened arch will in both instances give a flattened thin lip when it is repaired. In all types the molding should be done so that the upper part of the maxilla as well as the alveolar process is molded over, otherwise the nose as a whole is not brought into the center of the face and when the lip is repaired it will be impossible to reconstruct a satisfactory nostril, but instead the nostril will be flattened, dropped without floor and satisfactory support for the ala; also in the molding care must be taken to avoid too much lateral pressure, for as has been shown in the earlier part of the paper there is little or no lateral

separation at the tuberosities, and these are to be left as the fixed point from which to mold the remainder of the arch.

The deformities that occur after operation will depend upon the type of operation done and the care with which molding is performed. In the Brophy type of operation, which necessitates a good deal of lateral compression, the union in front at the cleft is usually good, but the arch is often far from the nice rounded arch we are striving to reconstruct. In cases where the lip alone is repaired and dependence is placed upon the muscles of the lip to mold the jaw, we get a beautiful arch with little or no disturbance of dentition or tooth buds, but we never get good union in the cleft. Hence, if a middle ground is taken and the arch is molded and fixed without lateral compression, the ideal arch should be reconstructed. In order to accomplish this it is necessary to penetrate the jaw; however, the penetration is much farther forward than with the original Brophy method and without lateral compression of lead plates secured by wires. While not the ideal procedure on account of the possible damage to tooth buds, it certainly gives a large percentage of good arches if the molding has been correctly done.

Another very important deformity of the arch is that of scarring and pulling from contraction of scar, which has a tendency to laterally contract the arch. This is well seen when the premaxilla has been erroneously removed at operation in bilateral cases and the palate repaired posteriorly; here we find no semblance of occlusion but the lateral parts are dragged in by the scar so that the canines, if present, almost meet in the midline of the palate.

This pull from scar tissue is of extreme importance to orthodontists, for it is this condition that it is constantly necessary to strive to overcome and which accounts for the reason that so many cases of cleft palate that have been corrected after operation by orthodontia will not remain corrected; in other words, we have a loss of the bony arch of the palate to act as a brace and a persistent mesial pull from scar tissue following repair, which tends to gradually narrow the arch. Hence, the chief problem for the orthodontist is not only to correct alignment of misplaced individual teeth, but to constantly expand the arch; and with very few exceptions it is never necessary to narrow the arch if the original operation has been correctly done at an early age of election.

So much for the rôle of the orthodontist in cases after operation. Perhaps of greater importance is the treatment orthodontists can give in adult cases or older children before operation. By application of suitable appliances the arch can often be reconstructed far better by orthodontia than by surgery, the objection being that it consumes too much time and often more expense than these patients can afford. In cases of bilateral cleft in older children and in adults, it is of great value to have a contracting bar appliance applied to the canine region after the premaxilla has been replaced; the narrowing thus effected makes the repair of the front part of the palate much easier.

In clefts of the alveolar border, with intact palate posteriorly in adults, the whole correction can be done by orthodontia after the lip is repaired by

banding the incisor next to the cleft and affixing a tongue to this band so that the pressure of the new lip will be exerted against this tongue and thus swing the incisor into place and close the cleft.

In conclusion it should be remembered that much can be accomplished in these cases by cooperation between orthodontists and surgeons. The former must bear in mind what is causing the conditions he has to cope with, and the latter must realize what can and what cannot be accomplished by orthodontia. It might be well in these cases to modify the adage, "The Lord helps those who help themselves," to read, "The Lord helps surgeons and orthodontists who help one another."

THE GROWTH OF THE ALVEOLAR BONE AND ITS RELATION TO THE MOVEMENTS OF THE TEETH, INCLUDING ERUPTION*

By James C. Brash, M.C., M.A., M.D., Birmingham, England
Professor of Anatomy, University of Birmingham

(Continued from March issue.)

IT WILL be observed from these figures that in Nos. 15 and 12, aged thirteen and twenty weeks with increments representing two and four weeks' growth, respectively, the increase in length of the roots is slightly less than the corresponding growth upwards of the interalveolar septum. The maxillary molar of No. 15 is an exception to this statement, but it completes this short series in that it represents an earlier stage when the tooth is not yet closely embraced by the walls of the crypt as these become transformed into alveoli; in this particular tooth the roots are just beginning to join each other; their growth and the growth of the floor of the crypt have not yet been sufficient to bring them into contact. With this exception, it follows that the distances travelled by the crowns of these teeth have been slightly greater than the lengthening of their roots during the same periods.

No. 2, on the other hand, twenty-eight weeks old and towards the end of the period of eruption of the first permanent molars, shows the opposite condition, the elongation of the roots during the four weeks' growth represented by the increments being about twice as great as the distance travelled by the crown during the same period. It follows that in the first two the apices of the alveoli should be travelling towards the surface by deposition of bone from within, though relatively the alveolus appears to deepen since the surface itself is travelling faster, and in the third that the reverse should be happening—an excavation of the apices from within to receive the increment of the roots. An examination of the alveoli in section demonstrates that the position of the new bone is in exact correspondence with these deductions, the apices of the alveoli in Nos. 15 and 12 showing a layer of new white

*Read before the British Society for the Study of Orthodontics.

bone, while the apices of the alveoli in No. 2 on the other hand are red with signs of absorption (Fig. 11). On turning to the points where these apices approach the mandibular and maxillary canals it is at once obvious that as the roots grow down into the bone they are beginning to appear in these cavities, but separated from them by tiny caps of new bone formed on that side. It is the usual combination of the two processes; absorption makes way for these roots, and on the cavity side new bone is added which prevents them from penetrating it.

This is the terminal stage in the relation established between tooth and bone by the process of eruption. Owing to the rapidity with which the tooth is raised, the growth of the roots is for the greater part of the time less than the distance travelled by the crown. Towards the end, however, with the slackening of the rate of bone growth towards the average of the alveolar border, the growth of the roots becomes relatively greater so that the process at work is reversed in the depths of the alveoli. Thereafter

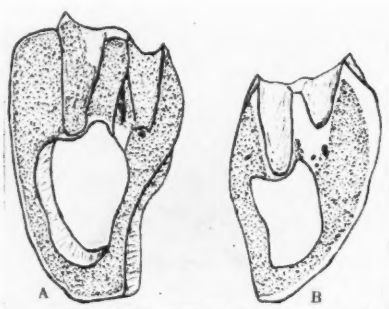

Fig. 11.—Sections of the alveoli of mandibular first permanent molars to illustrate the different directions of apical bone growth at different stages of eruption. The stippled areas represent old bone, the white areas new bone laid down during periods of four weeks. (*A*) Proximal surface of distal alveolus of mandibular M1, from a pig 28 weeks old; (*B*) distal surface of proximal alveolus of manibular M1, from a pig 20 weeks old. In (*B*) the vertical rise of the tooth is proceeding faster than the growth of the root, and the new bone is being laid down on the inner side of the apex of the alveolus and is continuous with new bone on its lingual wall; in (*A*) the growth of the root is proceeding faster than the vertical rise of the tooth, and the new bone is being laid down on the mandibular canal side. x½.

the rise of the tooth is at the rate of the general growth of the alveolar border, and as the roots attain their final length, they begin again to draw away from the apices of the alveoli; these are again filled up by new bone deposited from within, followed in turn by the excavation of the maxillary and mandibular canals. For some time the relation thus established between the apices of the teeth and these canals is maintained by the same process, but as the jaws of the pig increase in size, and especially in the mandible as the tusks grow backwards, alveolar growth outstrips expansion of the canals, and the roots once more become separated, in the mandible to a comparatively great distance, from the cavities.

There can be little doubt that the appearance of the roots of the molars projecting into the maxillary antrum, as they often do in the human skull, is brought about by the combined process of downward excavation of the antrum and, in the later stages, upward growth of the roots in the manner observed in the jaws of the pig. All the variations in the matter of the rela-

tion established by the roots of the teeth—molars, premolars and canine—to the antrum are certainly due to this combination, though the variable extent and direction of the expansion of the antrum is mainly responsible.

To sum up the conclusions to which observation of the process of bone growth in relation to the eruption of the first permanent molar in the pig inevitably leads, it may be said that the phenomena observed in the continual rise of the fully erupted fourth deciduous molar and in the more rapid rise of the erupting permanent molar behind it are exactly of the same nature. The cause of the rise of the permanent molar in eruption must be the same as the cause of the continued rise of the erupted deciduous molar, and in succession of the permanent tooth itself behind it after eruption is complete. Bone growth is the common and the decisive factor.

It is hardly necessary for the main purpose of the present paper to detail here the similar evidence that is forthcoming from a study of the stages in the eruption of the third permanent incisor. It is sufficient to say that in the eruption of a single-rooted tooth there is the same comparison to be made with a fully erupted tooth rising in the growing border. In both there is the

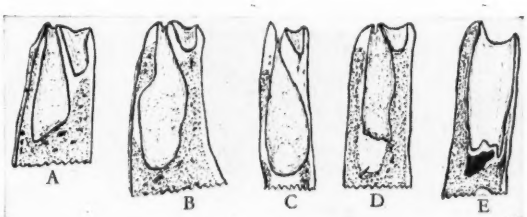

Fig. 12.—Series of sections of the crypt and alveolus of the third permanent mandibular incisor to illustrate the sites of new bone deposit during the eruption of that tooth. The stippled areas represent old bone, and the white areas new bone laid down during various periods. (*A*) From a pig 13 weeks old, 2 weeks' growth; (*B*) from a pig 18 weeks old, 3 weeks' growth; (*C*) from a pig 20 weeks old, 4 weeks' growth; (*D*) from a pig 24 weeks old, 4 weeks' growth; (*E*) from a pig 28 weeks old, 4 weeks' growth. The upward and labial movement of the crypt and the socket is indicated by the distribution of the new bone, with consequent extrusion of the deciduous tooth on the lingual side. x½.

same growth of new bone, separated from fully erupted by alveolodental periosteum, but from the erupting at first by the tissues of the toothsac. As the tooth increases in size and begins to approach the surface, these are reduced to the alveolodental periosteum as the bone simultaneously closes upon it to transform the flask-like crypt into the narrowed socket (Fig. 12).

A further note will be made on the eruption of successional teeth after the discussion of labial and proximal movements. We shall then be in a position to consider the relation of the expanding crypts to the movements of the deciduous teeth, to define more precisely what we mean by "eruption," and to view the process in better perspective than has hitherto been possible without a knowledge of the constant movements of all the teeth.

THE GROWTH OF CEMENTUM AS A FACTOR IN THE VERTICAL MOVEMENTS OF THE TEETH

Before leaving the question of vertical movements of the teeth a remark must be made on the part played by the actual increase in the thickness of the roots of the teeth themselves, and of the under aspect of the crowns of

those with more than one root, by the growth of cementum. During eruption, and to a lesser extent in the fully erupted tooth, cementum thickens by surface deposit. This is a true bone growth, so that the term "alveolodental periosteum" is preferable to "olveolar membrane"; the articulation of the tooth is therefore a true synarthrosis—the gomphosis or peg-like joint.

The growth of cementum can be demonstrated by the madder method, and its addition to the surface during a nonmadder period is partly responsible for the apparent fading towards the crown of the red dentine of the roots of the teeth. Section of a growing root demonstrates the true state of affairs, as the red center is then seen to be covered by a thin white layer on both surfaces, due on the pulp side to the addition of dentine, on the outer, of cementum (Fig. 13).

Growth of cementum proceeds throughout the life of the tooth and there can be little doubt that its increase is a contributory factor in the movement of the teeth vertically in the alveolar border both during and after eruption.

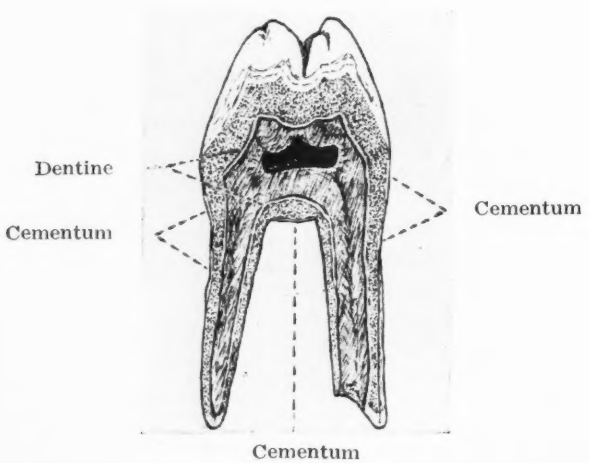

Fig. 13.—Section through the distal roots of the left mandibular first permanent molar of a pig 28 weeks old. The stippled area represents old dentine and cementum, the narrow white area lining the pulp chamber new dentine laid down during four weeks' growth, and the patches of white on the outer surface of the roots the addition of new cementum. The cementum patches are exceedingly thin and are proportionately much too thick in the drawing. The growth of the apieces of the roots is also represented. x2/3.

I am unable at present to measure or estimate this factor, but it is probable, however slight it may be, that its importance relative to alveolar bone growth alters a little progressively with growth. During rapid growth of the jaws there can hardly be said to be any comparison at all, but probably cementum additions gradually acquire a greater rôle. There ought, if cementum additions have any measurable effect, to be a slight discrepancy between observed additions to alveolar bone and the actual vertical movement of the tooth, but this discrepancy must be so small as to be within the error of observation. Moreover, the effect of cementum growth is discounted and possibly neutralized altogether by a progressive diminution in the thickness of the alveolodental periosteum, but I have no data on which to come to a conclusion on this small point.

There may, however, be conditions under which cementum growth increases in importance, so that it may perhaps take the place altogether of

alveolar bone growth. In the gradual extrusion, for example, of fully-erupted teeth from their sockets, if for any reason they be unopposed, it is possible that a thickening cementum plays an important part, but in the absence of exact information regarding its progressive increase and the distribution of alveolar new bone in such cases, this must remain a speculation only. Certainly the apices of the alveoli will fill up as the tooth rises, though if the process proceed to the point of actual extrusion of the tooth, this will merge into the subsequent absorption of the bone.

THE CONTINUED MOVEMENT IN THE ALVEOLAR BONE OF PERSISTENTLY GROWING TEETH

Another question that suggests itself in this connection, and with reference to the whole problem of the eruption of teeth and their continued movement in the alveolar bone, is the as yet undiscovered cause of the constant forward movement in the bone of teeth growing from persistent pulps. This cannot be due to the growth of the pulp itself, since that is efficiently protected from pressure, as for example in the incisors of rodents, by the invariable curvature of such teeth. During the earlier stages also, before eruption and during eruption and even for some time after the tooth comes into use, the rapid growth of the root leads to its movement backwards by associated absorption and reformation of its alveolus in the manner described for the inward growth of the roots of the molars in the last stage of their eruption, so that the growing ends of the mandibular incisors ultimately come to lie behind the root of the coronoid. This process I have observed in the growth of the incisors of the rat by means of the madder method.

Nor can the continued movement be due to bone additions to the alveolar walls after the growth of the jaw is complete. This I believe to be the immediate cause of the movement of these teeth, as of any others, during eruption and probably a little longer, but a continuation of the same process after the growth of the jaw has ceased would inevitably lead, since the alveoli then become stationary, to their filling up and an arrest of the movement.

But the teeth themselves continue to move forwards, and as they move they carry with them the constant additions to their enamel and cement which they receive from the persistent enamel organ and the alveolodental periosteum. On the analogy of the cement factor in the rise of erupting and erupted teeth of limited growth, and by a process of exclusion, I conclude, or should I say I hazard the speculation, that since the enamel organ and the addition of cement lead to an increase in the diameter of the deeper part of the tooth, the tooth accommodates itself to the slightly tapering alveolus by moving forward, a process possibly assisted by the spiral curvature (Fig. 14). Thus the growth of the tooth, in the special case of persistent growth, may itself be responsible for the movement that is constantly going on, not by elongation of the root but by gradual increase in the diameter of its buried portion.

If this be the true explanation, then this puzzling special phenomenon comes into line with the general observations I have previously made. That the force is considerable is well known, witness the reentrance into the skull

of the tips of the maxillary teeth if for any reason they be unopposed, but then the force of eruption is also considerable; although in the case of eruption an external force may be sufficient to deflect the tooth because of the accommodating nature of bone growth, in the forward movement of a persistently growing tooth the force of the increase in its diameter in a socket, which, if the tooth stays where it is, will soon be too narrow for it, cannot be denied.

I hope in due course to be in possession of a complete series of madder specimens to illustrate these points, at present, as I have said, in the speculative stage, by the growth, eruption and persistent growth of the canine in the pig. Meanwhile I can only say that a consistent theory of the move-

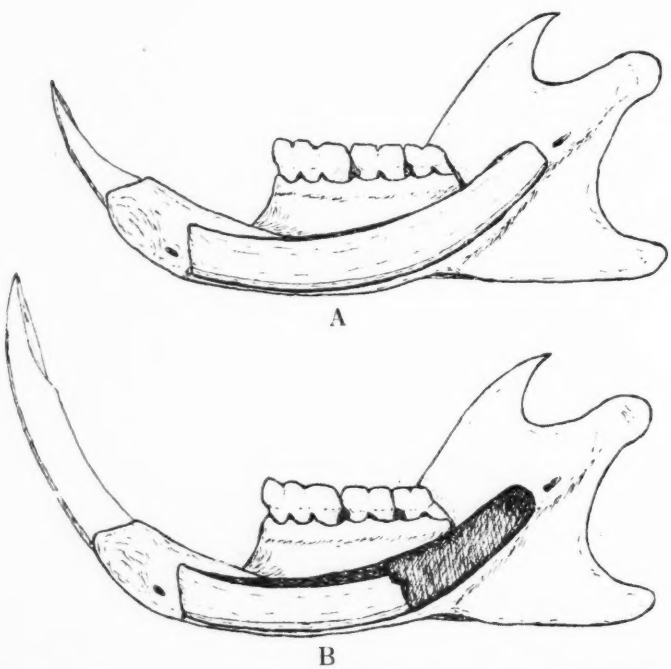

Fig. 14.—The lingual aspect of the right half of the mandible of a rat (No. 61A) 18 weeks old. The lingual wall of the incisor socket has been removed to show the position of the tooth. (*A*) The tooth is in its natural position, occupying the whole of the socket with the apex of the root, owing to the slight spiral twist, turned outward to occupy a slight elevation on the lateral aspect of the mandible just below the coronoid; (*B*) the tooth is partially extruded from the socket to show that the root does not occupy the whole diameter of the midde part of the socket. The slight apparent diminution of the diameter of the extruded portion of the tooth is due to the rotation consequent on the spiral curvature. x3.

ments of the teeth must not only account for the ordinary movements of ordinary teeth but must also offer an explanation of all special cases. Another example, in which there is evidence amounting to proof, will be cited after the discussion of movements of the teeth forwards in the alveolar border.

MOVEMENTS OF THE TEETH IN THE LABIAL DIRECTION IN THE GROWING ALVEOLAR BORDER

The second line in which movements of the teeth may take place in the alveolar border is at right angles to its edge, either in a lingual or a buccal direction.

Now there are many recorded facts of increase in interalveolar and interdental measurements both in the maxillary and the mandibular jaws. There are three possible explanations.

1. There may be sutural separation between the two maxillae. This cannot, of course, apply to the one-piece mandible, and for reasons already explained I am not yet in a position to affirm positively that it does or does not occur.

2. Growth in an alveolar border which is obliquely set may carry outwards with it teeth which are rising vertically in relation to that border. In the maxillae the direction of alveolar growth is downwards and outwards both in the pig's and the human skull (Figs. 15 and 16). The result of this alone must be an increase in the alveolar curvature with spacing of the teeth in the front of the arch and transverse separation of the molars. This is in fact

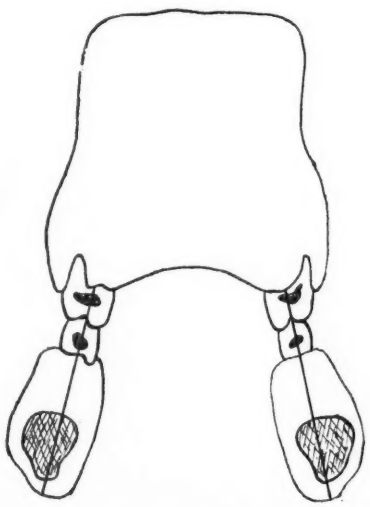

Fig. 15.—Outline of frontal section of the jaws of a pig, 17 weeks old, through the fourth deciduous molars, to indicate the direction of growth of the maxillary and mandibular alveolar borders in that region. *Cf.* Fig. 16. x2/3.

observed, and in the pig, since the direction of the anterior part of both arches is largely forwards, there is also an addition to the anteroposterior length of the face and a separation of the teeth from the second incisor to the second premolar, apart altogether from the question of possible separation at the premaxillary-maxillary suture.

In the molar region of the mandible, however, the direction of the teeth and of the alveolar border is upwards and inwards. The molars in the human mandible are also set in this direction (Fig. 16). At the end of the eruption of the first permanent molar in the pig, to be precise, the fourth deciduous molar is vertical, the permanent molar behind it is directed upwards and inwards and the teeth in front of it increasingly upwards and outwards. Separation of the first permanent molars therefore cannot be due simply to the direction of the alveolar border.

3. There may be movement of the teeth themselves outwards or buccally in the alveolar border which implies an outward thickening of the border

itself into which the teeth move, irrespective of the direction of the vertical growth taking place at the same time. This also would mean a widening of the arch all round or in particular places.

Observation shows that in addition to the undoubted effect in the anterior part of both maxillary and mandibular arches, and also in the posterior part of the maxillary, of the oblique direction of the alveolar borders, the teeth in the pig do move buccally in the border in both jaws. The difference in the general appearance of the lingual and buccal surfaces of the body of the mandible in madder specimens is very striking, for with minor

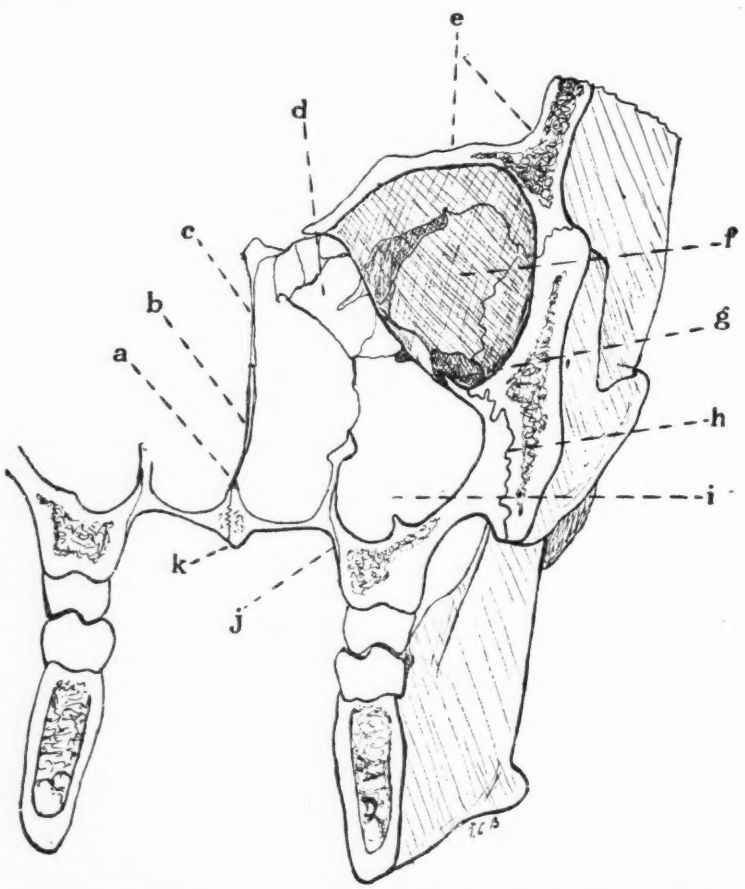

Fig. 16.—Frontal section of human skull, passing between the first and second permanent molars, to indicate the direction of growth of the maxillary and mandibular alveolar borders in that region. x¾. (*a*) Nasal crest; (*b*) vomer; (*c*) vertical plate of ethmoid; (*d*) lateral mass of ethmoid; (*e*) frontal bone; (*f*) great wing of sphenoid; (*g*) infraorbital canal; (*h*) malomaxillary suture; (*i*) antrum of Highmore; (*j*) palatomaxillary suture; (*k*) median palatal ridge. (Block kindly lent by the Dental Board of the U.K.)

exceptions in relation to the foramina and other points, each with its own significance, the outer surface is covered by a layer of new bone extending right to the alveolar edge. The lingual surface, on the other hand, is almost as red as the buccal is white, telling us that here as a contrast no new bone is in general being laid down, though again there are exceptions, notably at the edge of the alveolar border itself (Plates I and II). It is clear, therefore, without considering the evidence provided by small areas of absorption near

the border on the lingual surface and the question of the extent over which this surface is stationary, that the alveolar border shares with the rest of the body of the mandible a growth outwards.

A similar process is at work in the maxilla, though here it is masked by two circumstances—the large area of absorption on the outer surface as the malar process and the maxillary sinus move backwards, and on the inner surface the partial filling up of the alveolopalatal angle with new bone, as the palate descends with the border.

The evidence that the teeth are themselves actually moving outwards in correspondence with this growth is to be found in the details of the sites of new bone formation in the individual alveoli. The details concerned in labial movement of the teeth are best seen in sagittal sections of the mandible passing through all the alveoli; in general it is to be observed that in the deeper parts of the alveoli, which on account of the upper parts being entirely new through vertical growth are alone available for this purpose, there is a thin covering of new white bone on the lingual wall, whereas the labial wall is red in the same situation (Plates III and IV). It is right to state that the observations are in the case of some teeth, as for example, the maxillary deciduous molars, further complicated by the obliquity of their lingual and buccal roots, so that on the opposite sides of the alveoli the picture approximates to that seen in the diagram which I have used to illustrate the distribution of new bone and absorption associated with the upward movement of teeth with spreading roots (Fig. 9).

Nevertheless the general inference is clear that the teeth without exception in both jaws of the pig move outwards in the alveolar border, and that a definite contribution is thereby made to the widening and opening out of the arches. The extent to which this movement takes place differs with different teeth, and is associated with varying rates of deposit of bone on the outer side of the arches; it is not yet possible to assign exact proportions in the widening of the arches to the oblique direction of the alveolar border itself and to the labial movements of the teeth in it.

It may, however, be said that in the mandible, as is anticipated from the varying direction of the alveolar border, buccal movement of the teeth is most obvious in the posterior part of the arch. In the region from the third incisor to the second deciduous molar it is at a minimum; here the obliquity of the border becomes very great, and it is to be observed that new bone formation on the outer surface is also at a minimum. In the region of the first and second incisors, on the other hand, great forward obliquity of the border is combined with strong additions to the outer surface of the jaw and a considerable labial movement of the teeth.

It is also a matter of considerable interest to note that the corresponding teeth in the two jaws may be increasing their interdental distances under quite different conditions. The last deciduous molars and the first permanent molars owe their increasing separation in the maxilla mainly to the oblique buccal direction of the alveolar border, whereas in the mandible it is wholly due to buccal movement in a growing border which is lingually

directed. This is equally true of the human jaws, and it raises the question of the possible control of the mandibular movement by the maxillary separation. But discussion of questions of this nature, which might conceivably be made the subject of experiment, is not within the scope of this paper, in which I am concerned only to demonstrate the facts of bone growth which can be observed in the alveolar border.

As a special case of buccolingual movements I may perhaps cite the course which the permanent molars follow as they erupt and come into occlusion. For as these teeth erupt and come into anteroposterior line with the teeth in front, they must, on account of their developing position in the root of the coronoid and in the alveolar bulb of the maxilla, undergo a rotation (Fig. 17). In the mandible the long axis of the molars as they begin to

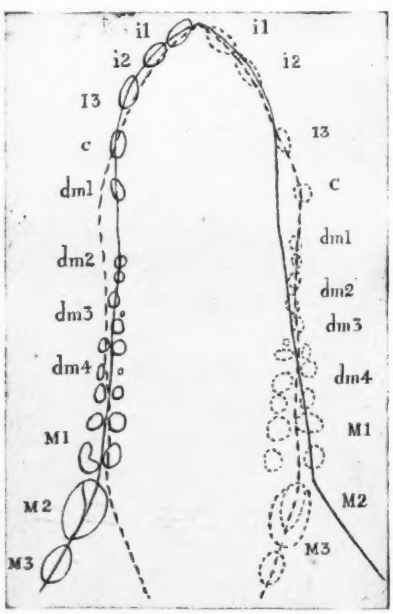

Fig. 17.—The "Midlines of the alveolar arches," maxillary and mandibular, in a pig 32 weeks old, superimposed to show the opposite directions of the posterior ends of the alveolar borders. The position of the mandibular alveoli is represented on the left side by continuous lines, the maxillary on the right by interrupted lines. The mandibular borders diverge into the roots of the coronoid processes, whereas the maxillary converge in the "alveolar bulbs" toward the middle line. x½.

erupt is directed forwards and inwards in accordance with the direction of the root of the coronoid process in which they develop, and as they erupt they rotate, clockwise on the right, anticlockwise on the left, both moving buccally at their proximal ends and lingually at their distal. The maxillary molars on the other hand are first directed with their long axes forwards and outwards in accordance with the line of the posterior extension of the alveolar process which I have termed the bulb. They, therefore, rotate as they erupt in the opposite direction to the corresponding mandibular teeth. But this is not the only peculiarity of the movements of the molars during eruption, since their crowns are also set obliquely to the horizontal plane. The extension of the mandibular alveolar border is clearly distinct in the root of the coronoid,

and projects through the inferior dental foramen in the pig, and the corresponding maxillary alveolar bulb (which is to be compared with the alveolar extension on to the posterior wall of the antrum in the human maxilla) also slopes upwards. The crowns of these teeth are, therefore, from the beginning of their development in astonishingly close approximation to each other when the jaws are closed (Fig. 18). Their directions are moreover reciprocal as the maxillary look downwards and backwards, and the mandibular, upwards and forwards. As these teeth erupt, therefore, they not only rotate in the manner described, but they both appear to descend into the newly formed parts of the alveolar borders which are to receive them, the maxillary from above in the direction of eruption, and the mandibular also from above apparently in the direction opposite to that of eruption. This is an appearance only, since what actually happens is that the parts of the coronoid and of the bulb in which they lie become transformed into alveolar border, but it is

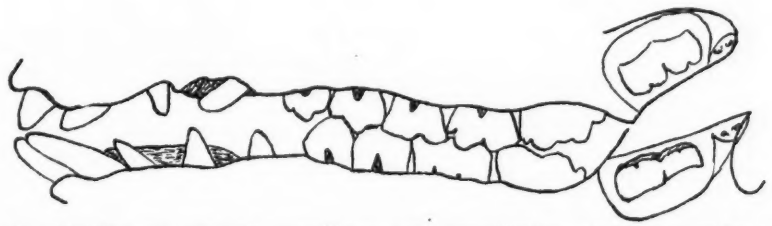

Fig. 18.—Outline of the left maxillary and mandibular alveolar borders of a pig 20 weeks old with the contained teeth to show the vertical relation between the posterior continuations of the borders into the root of the coronoid in the mandible and the "alveolar bulb" in the maxilla. The forward and downward direction of the maxillary border in the region of the cheek-teeth may also be noted. x2/3.

worthy of note that the maxillary molars come down by the rapid growth of their crypts towards an alveolar border which is growing away from them, whereas the mandibular attain the same position by the rising of the alveolar border to the corresponding level. At the same time both the teeth undergo a rotation in the vertical plane so that the posterior part of the crown of each travels downwards as they assume the horizontal position. These movements are, of course, well known in the eruption of the human molars, and a failure to complete the rotation in the vertical plane is commonly responsible for impaction of the last molar in the mandible. The point is that these movements are taking place and are normally completed before the teeth have come in contact with one another, and it is hardly possible to conceive any force capable of producing them other than the corresponding bone additions and absorptions which can be exactly traced in the jaws of madder-fed pigs.

(To be continued in May issue.)

THE BUSINESS SIDE OF ORTHODONTIA*

By G. L. Turner, Wichita, Kansas

IT IS my purpose to include in this very important, but seldom discussed subject, the points of most vital interest to the profession today. This subject should be of general interest to both the beginner and the experienced orthodontist. Before writing this paper, I was unable to find a single article in my library bearing on the business phase of our work, and what points may be given here will be those gained from practical experience and from some of our splendid teachers.

Few orthodontists seriously consider the value of proper records, files and case histories. This is true to such an extent that many times most valuable clinical discoveries are overlooked instead of being observed and passed on to other men. Too many of us are entirely satisfied with results obtained and lack the ambition to more closely apply the principles and lessons taught us in our daily routine of office and laboratory work.

Most orthodontic cases come to us by reference from our dental and medical men and from our own patients and friends. It is really surprising how few are referred by the medical profession, most of these being from the nose and throat specialists. The medical profession as a whole is not deeply concerned about orthodontic treatment and this condition is largely our own fault. We do not meet with them and explain our specialty as we should. Also, they are busy in their own field of endeavor and generally find only conditions which interest them individually. One of the best means of education of the laity is through papers and talks given at Parent-Teachers' meetings. The officers of Parent-Teachers' associations are always anxious to have such matters discussed. All parents are interested in the health and happiness of their children and when they know the benefits to be derived from orthodontia, they are generally very desirous to have consultation of orthodontists and get the work started. We should always be prepared to bring out such points as prevention of caries, prevention of pyorrhea by the proper relationship of the cusps, the importance of personal appearance, the effect mentally and physically upon the child, the benefits of proper normal breathing, and normal mastication, and the improvement in health and happiness in general. Such results cannot be measured in monetary terms. Sincerity and frankness, together with a pleasing personality and hormonious office environment, will greatly aid in securing cases and the parents will not think so much of the fee involved when adequate remuneration is named in return for your services.

Let us briefly discuss the question of orthodontic fees. Many of our dental friends today look upon the field of orthodontia as the most lucrative of all specialties. It may or it may not be. Some of us think the locality

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governs the fee to be charged perhaps more than any other one factor but such as not often true. The laity today is becoming educated to the value and advantages received from orthodontic services, when properly rendered, and in most cases, are quite willing to pay well for our work. We must not forget the time, expense, experience and equipment necessary to prepare ourselves for our profession. Neither must we lose sight of the fact that at best the average life of those in our profession is short. Surely we are worthy of a competence which will care of us in our declining years and we should ever strive to do the very best of which we are capable and likewise require fees in proportion to services rendered.

Under no circumstances should we give commissions to our dental friends as an inducement to refer cases. Nothing belittles a dentist more in the eyes of his fellowman when such a practice becomes known. I have never felt that the nose and throat men to whom my cases are referred for removal of nasal obstructions should in any way remunerate me. We owe this to one another. If we desire to do something for those referring cases to us and also for men we feel should be more interested in our specialty, we can send them THE INTERNATIONAL JOURNAL OF ORTHODONTIA, ORAL SURGERY AND RADIOGRAPHY gratis for a year. They will necessarily think of us twelve times during the ensuing year and are sure to read some of the fine articles contained therein. Such education is very important. We must do our part in education today. The laity, the medical and dental professions will be all the more interested when they really know what we are doing.

Many times the first remark, after patient and parent or parents enter our office is, "Well, Doctor, we want to know first of all what this is going to cost." Never answer this question until you have made your diagnosis, obtained your case history, radiograms and impressions. By this time the parent's mind is more concerned about other matters than just the actual fee involved. Now make an appointment for the second visit so that you will have had ample time to properly study the case in question from your x-rays and study casts. You will also have had time to determine the parent's ability to pay, his credit rating and whether or not this is a desirable case.

At time of second appointment, when possible, have both parents present. Show them the study models, let them visualize the actual condition of John's mouth and you will generally find they are much more interested than when only a glance at the mouth is made as an examination. This is when you can advise them of your fee and, if requested, give an idea of time necessary to do the work. By all means impress the parents with the fact that your estimate of time is only an idea, based on the length of time necessary to treat a similar type of malocclusion of a patient or patients of similar age and physical health and when proper cooperation is given. We know how impossible it is to predetermine length of time necessary to treat any individual case. This one point of understanding at the beginning of treatment is the means of much better relationship throughout period of treatment, however brief or extended it may be. Be sure to collect at least one-half your appliance fee or retainer fee at time of second visit as this is the most psychological time.

When cases are started at the first consultation, the impressions are taken, separating wires placed when necessary, photos made and also the radiographic record. This usually requires only about thirty minutes and the patient does not become tired in this time. This first appointment is the ideal time to collect the appliance or retainer fee. The appliances are placed at a subsequent sitting, after which a memorandum of agreement—not a contract—is mailed to the parents or guardians which serves to refresh their minds relative to verbal agreement and in some instances will serve to avoid slight misunderstandings at a later time. Do not bind yourself with any agreement. When the full amount is requested in advance, as in some cases it will be, be sure you include sufficient and even then often you are the loser.

The question of consultation or diagnostic fees should be left to the individual but in most instances should be made, even though rebated later when case is started. This method will not only eliminate "shopping" but places the office on a higher plane and will go far in taking care of some overhead expenses.

I just wish to stress the value of the x-ray in our work. It is indispensable. Only a few cases may be handled without radiograms and these are so few in number that to diagnose and institute treatment of a single case without pictures is certain to cause failures, discredit and considerable embarrassment.

The question of illness and vacation will arise in some instances. If there is any lengthy duration of illness so the appliances must be removed, certainly no charge should be made for such period. However, charges should be made for replacing appliances and for any changes necessary. Vacations of a few weeks should not be considered when appliances are working. Always arrange, whenever possible, to direct your patients to a near-by orthodontist should any trouble occur. It is well to so notify your choice or preference of men, when your patient is to be in their city for any length of time.

When our patients move away from us and go to live in the territory of another orthodontist, we should give the specialist to whom we transfer such cases the full record, including case history, plan of treatment so far used, appliance and monthly fee charged, radiograms and any other information relative to the particular case.

A real problem which frequently confronts the busy orthodontist is that of requests from the general practitioner for assistance in handling cases and construction of appliances. This requires genuine tactfulness. The more fact that he has come to you for assistance is admission that he knows nothing about the work, and therefore, it is generally best not to encourage him. However, it is much better to be frank and tell your dentist friend that such is not advisable, when you decide his case is one that can only be successfully handled by a skilled orthodontist. How can some of our dentists hope to handle some of the cases attempted by them without the necessary knowledge of diagnosis and proper training along orthodontic lines? Many times patients suffering from posteroclusion of extreme type have presented themselves for treatment which had formerly been attempted by dentists in gen-

eral practice, and when informed that all nasal obstructions must first be removed before satisfactory results could possibly be obtained, they were very much surprised. Such necessary preliminary diagnosis had been entirely overlooked.

Should we grant some professional courtesy to physicians, dentists and nurses? In some instances, this is a good policy but be very cautious or you will soon find your time too full of such cases. An orthodontist's time is necessarily limited and only in very unusual cases should we make such professional reductions. Many, many times these courtesies are not appreciated and proper cooperation is not given. Of course, this question can only be settled by the individual but careful forethought will prevent too many unprofitable cases. Intimate friends and relatives should always be given the regular fee, or a higher one, as they are going to boost for you anyhow without such inducement. I do feel it is our duty to grant ministerial discounts since a number of our ministers are even today receiving very small salaries, and their calling is indeed a most worthy one. Of course, the higher salaried men will not expect any such reductions.

Now let us pass on to the business end of our office administration. Simplicity of records is certainly an important factor. Let us have all records constantly at our finger tips. The filing-cabinet systems in use today in the busy modern offices are very well fitted for our work. Cabinets containing four drawers or sections prove most efficient and suitable. At first, one four-section cabinet will suffice and later other sections may be added as needed. Mahogany finish is generally the most appropriate finish to harmonize with other furnishings in the office. Such filing cabinets will take care of case histories of all active, passive and completed cases, prospective cases, business correspondence and receipts as well as your personal filing. Carbon copies should be kept of every letter going out of the office. Such a system is obviously very essential. No business of any importance could exist today if no more system were employed in its administration than is often found in that of a busy orthodontist. A small file for keeping appliances is also of great value, a file for appliances newly constructed and not yet placed, those which are for active and passive cases which may not be in use all the while, and those removed from completed cases. Much time is saved as well as expense by having all appliances where they are readily accessible. This file belongs in the laboratory and should be small.

Of course you will each keep records so that your income tax can be readily computed. Many good income tax books or systems are on the market today and they are inexpensive. When you have kept proper records of your professional income and your expenditures, it is not necessary to engage the services of a tax expert to render your annual statement to Uncle Sam.

Collection of accounts is a "thorn in the flesh" to many of us. This should not be true at all. Consider the installment method or system of purchasing so popular today. Our merchants have an agreement whereby they are able to pick up their merchandise when payments are not promptly made. This we cannot do, but we are in a position to stop case treatment if accounts become in arrears. How many ever do so? Suppose we wish to borrow at

the bank. Are our outstanding accounts of any value to us as a security? No, the banker would only laugh at us should we dare mention them as collateral. But the merchants can present their accounts as collateral because of their more business-like manner of extending credit and the banker will honor them.

Have a thorough understanding when a contract is drawn up, do not promise to do the impossible, and collect a sufficient amount at the time the case is started and insist that all payments be kept to date as agreed upon. Have a list of statements mailed each month before you, and see that those not paid by fifteenth are notified. The telephone is a most valuable agent for this purpose and a telegram is also usually most effective. Do not hesitate to sue on accounts after you have exhausted other means. We only encourage a slow-pay clientele when we do not collect accounts due us, thereby placing the professional man in the often embarrassing position of being unable to promptly meet his own obligations.

I have found it generally a poor policy to exchange professional fees for merchandise or other services. It is far better to pay cash for what we purchase and let our clientele pay us accordingly and thus avoid any chance of misunderstanding or differences.

The bank account is sometimes very carelessly handled. You should know at all times your approximate balance and keep on the good side of your banker by not overdrawing and causing him unnecessary worry and perhaps lose your good rating with him or with the payee of your check, should your bank refuse to honor it. We should pay all accounts and business items of any size by check and request receipts for all small items not paid by checks. It is a good policy not to cash checks given in return for services but deposit them, keeping a duplicate slip of deposit for future reference. This provides a duplicate record of payments made to you, as they are usually by check.

Then there is one other consideration which may seem small, but that means so much to our little patients. Let your assistant or secretary always remember their birthdays with some appropriate card or greeting and affix your own name to make it more personal. A small card index file or tickler is ideal for this purpose. Should our little friends become ill, fracture a limb or suffer other misfortune, let us not forget to remember them with flowers, books, etc.

It certainly would seem that the question of finance and investments need not be mentioned but quite the contrary is true. Orthodontists, as a general rule, have a good income but the number of "get-rich-quick" schemes to which they subscribe is appalling. The best advice is to consult your banker, he is making this his business and his judgment is very reliable. He will always approve of Building and Loan Stock and Life Insurance, and will always be only too willing to advise you, if you will only give him the opportunity. This will enable you to become better acquainted with him. "Before you invest, INVESTIGATE," is a good slogan.

In closing, I wish to thank you for the interest and attention manifested and invite your discussion and criticism, as it is only in this manner that we may individually derive the greatest amount of good from our professional papers and talks.

THE INFLUENCE OF MATERNAL TUBERCULOSIS, DURING PREGNANCY, UPON THE DEVELOPMENT AND VITALITY OF THE TEETH AND OSSEOUS STRUCTURE OF THE CHILD*

By R. B. Homan, M.D., El Paso, Texas

LONG ago it was found that the belief in maternal impressions in the pregnant woman affecting the physical appearance of her offspring was greatly exaggerated. It is no longer thought that the fact that a mother looked at a monkey during pregnancy accounted for her boy being "monkey-faced"; or the fact that the mother had an unnatural appetite for strawberries was responsible for the little red patch or birthmark on the skin of the child's face; or that if a mother opened oyster shells while pregnant her child would be apt to have harelip.

We do know, however, that the physical condition of the pregnant mother, the care that she has and takes of herself, the food which she gets, and her environment generally affect, very materially, the physical development of the child.

For some inexplainable reason we have been a long while applying the laws of genesis to mankind, and we were slow to recognize the importance of prospective parents keeping themselves in the best possible physical and mental condition during the reproductive and childbearing period of life.

The breeder of live stock saw the importance of many of these things before their application to mankind was thought of, and the breeder of fine stock goes a step further and selects, with great care, the animals which he is to mate for best results. He would not think of using a sire which is greatly undernourished or is in any way diseased or deformed, for the reason that he has learned that the offspring would be inferior. Likewise he is careful to see that the good sire is given the kind of care that will keep him in the best possible condition during the breeding season, and that the dam is given the proper food and care, and, in the case of work animals, that neither sire nor dam is overworked.

Breeders of swine long ago learned that the quality of pigs produced by a sow was greatly influenced, not only by the food which she had during pregnancy, but that which she ate prior to conception.

All breeders of live stock consider the health of both sire and dam as the most important factor in the production and development of the best specimens of their species. They realize that animals must be physically able to make proper use of materials given them for the purpose of producing creditable offspring. Let us hope that before many days we may come to realize this more as it applies to man as well as to the lower animals.

But, let us get a little nearer to our subject. Physicians know that many, many changes take place in the apparently well woman during pregnancy,

*Read before the Southwestern Society of Orthodontists, El Paso, Texas, December 5-8, 1927.

and that some of these begin immediately after conception takes place. The first few days following conception, and at most the first two or three weeks, are the most important, for this is the time that the embryonic structures are formed and the foundations for all the important tissues and organs in the child are being laid. The entire endocrine system in the mother is called upon, and many changes in the endocrine glands take place.

We are really just now beginning to realize, in a small way, what an important place these endocrine glands have in our lives, both in development and maintenance. We have recently learned that one of the important functions of the parathyroid gland, a small ductless gland of which very little was known, for instance, is that it has much to do with the proper assimilation and application of calcium, a very important element in our make-up. This little gland is so important that, when it was removed in dogs, death ensued as a result of lime starvation, in spite of the fact that lime was administered in every possible way. In other dogs, after removal of this gland, lime and small amounts of desiccated parathyroid gland were administered and their lives were saved. Many of the other endocrine glands, such as the thyroid and pituitary, are just as important, but we cannot go into this at length.

The healthy pregnant woman is able, in a great measure at least, to meet these demands, and to stand the great tax which these changes place upon her, without serious results, but I need only to mention a few things which the dentist observes in the apparently healthy pregnant woman to illustrate my point. Soft teeth, resulting from the demand for certain minerals which the mother must supply for the proper development of the child. In these we get what the old textbooks used to call "white decay." We may also observe what the old books called "black decay" as a result of a hyperacidity which often accompanies pregnancy, as well as loose teeth, and other indications of changes in the gums, likewise due to unusual demands upon the maternal tissues.

If these unusual demands are hard for the woman who is apparently well, what may we expect of the tuberculous woman? Let us see some of the things which take place when the woman becomes actively tuberculous. The poison which the tubercle bacillus throws off in its growth is a most powerful one. It greatly affects the nervous system, the digestion, and the whole glandular system, especially the endocrines. The blood-making organs are impaired, and soon the patient is anemic, loses flesh, and becomes generally weak, and apparently has a very poor resistance. There is such a disturbance of the endocrines that the extra demand for calcium and other salts and minerals which are necessary for healing the tuberculous lesion is very poorly met, or not at all.

In such a condition what could we expect in the development of the fetus, and in the teeth and bony structure especially? Recent statistics show that in health resort centers, crowded city tenement districts, and in other places where a good percentage of the adults are, or have been, tuberculous, there are 40 per cent more deformed and poorly developd arches, irregular and malposed teeth, and early decaying teeth in children than in other communities

of the same population. Likewise under the same conditions we find many more cases of rickets and deformities of bones and joints.

These all result largely from the inability of the tuberculous mother to supply to the developing child the elements which are necessary for the manufacture of good teeth and bony structure, due to changes produced by the toxines of tuberculosis, and especially its effects upon the endocrine glandular system.

The dentist can do something to aid in preventing such conditions by urging pregnant women who are his clients to partake liberally of the foods which supply minerals and salts freely, such as fruits, cereals, and vegetables, and to consult the family physician regarding the condition of their endocrines, and this is especially important if he suspects that she may be tuberculous.

EXCESSIVE ORTHODONTIC TREATMENT*

By Dr. O. E. Busby, Dallas, Texas

ORTHODONTIA in the past has been based more upon a local ideal than upon a general improvement of the individual. Future orthodontics must embrace a greater knowledge of the growth and functional development of muscle, as well as the movement of teeth and growth of bone. To my mind biologists, in the field of orthodontia, have been too little concerned with the relation of muscle to organic and structural changes.

A few years ago, Dewey, in a series of lectures, described the origin, insertion, relations and actions of many of the muscles most closely involved in the treatment of malocclusion of the teeth. This subject, apparently, has not shared equally in the interest and attention that have been given to the study of bone growth. Muscle, in the order of evolutionary events, is an older tissue than bone, less plastic and more difficult of correlation. Muscle is the most important and dominant of the elementary tissues. The movement of teeth and growth of bone should be a slow process in order to conform to the functional development of the neuromuscular system. I do not adhere to the idea of continuous treatment in types of cases where the prognosis indicates years of treatment and in which it would be practical during periods of rest to use appliances designed for the purpose only of retaining the teeth against a return toward their former malpositions and to maintain the induced bone growth. During these intervals, cells may renew their energy and muscles may grow and learn to yield and to function in these new evironments.

Orthodontists have given less attention to the development of function than to the development of structure. Many cases which have undergone orthodontic treatment and which in appearance have obtained the desired results, after appliances were removed, have lapsed to some degree of malocclusion. From this I am led to believe that the acceleration of the struc-

*Read before the Southwestern Society of Orthodontists, El Paso, Texas, December 5-8, 1927.

tural growth and design in other tissues was too rapid for and beyond the functional tolerance of muscle. In such cases as these which have come under my observation, the treatment had been continuous. But even had the treatment in these cases been intermittent the results might have been the same in some, for I believe the powers to respond to successful orthodontic treatment must be inherent to the idividual or that he must possess a process of creative synthesis.

Continuous or overtreatment is not consistent with nature's plan of successive growth. The teachings of biologists and the advent of delicate appliances designed by Mershon fit well into this scheme of periods of treatment and periods of retention. Muscular demands were probably the occasion of the change from oviparous to viviparous reproduction. Fundamentally, man owes his present organic and structural design to the unbridled audacity of muscle, and any organic or structural changes should be preceded or accompanied by the necessary muscular development if we expect permanent results.

"To a rational being it is the same thing to act according to nature and according to reason." —*Marcus Aurelius.*

Case Reports

PROGRESSIVE CHANGES IN HIGH LABIAL ARCH DURING TREATMENT*

By J. W. Ford, D.D.S., Chicago, Ill.

AS THE object of this report is to show the progressive changes made in the finger springs during treatment, I shall show these slides first. The remaining ones being supplementary to show progress of treatment.

Patient ten years of age. Subdivision of Class II, division 1.

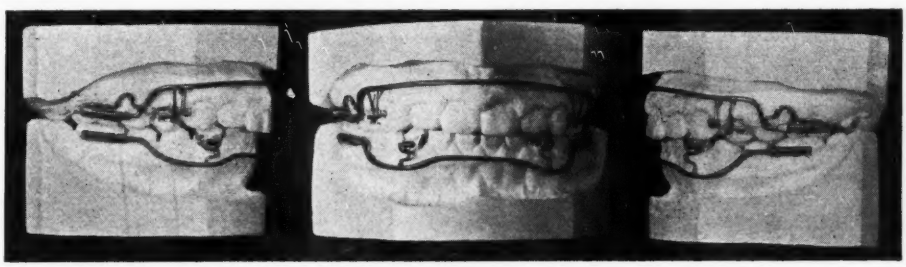


Fig. 1.

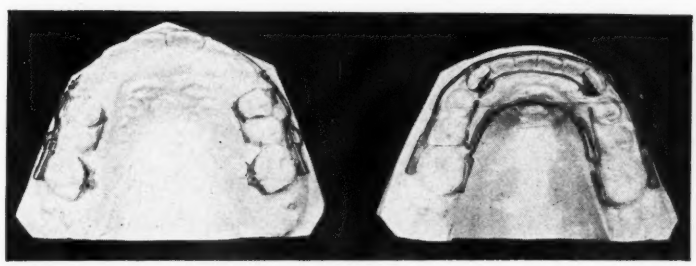


Fig. 2.

Fig. 1. *Upper*—17 gauge base wire in position. Arch locked in position by means of 0.030 wire loop soldered on ascending portion of arch with free end inserted into McCoy open tube soldered on gingival of buccal tube, the end being bent around distal of open tube to prevent anterior movement of arch; 22 gauge finger springs inserted into horizontal tubes on first premolars serve two purposes: first, to stabilize arch and anchorage, and second, to control expansion; 19 gauge hooks for intermaxillary elastics soldered distal to canines. *Lower*—17 gauge base wire in position; 23 gauge recurved finger springs entering McCoy open tubes on canines at distal, the portion engaged in the open tube being 0.030 wire soldered onto the 23 gauge finger spring wire. The recurved finger springs are used here to provide for greater range of adjustment.

*Case report read before the Twenty-sixth Annual Meeting of the American Society of Orthodontists, Chicago, May 2-5, 1927.

Fig. 2. *Upper Lingual*—19 gauge wire soldered to first premolar bands with free ends resting on second premolars which transmits to them the expansion pressure of the buccal springs on the first premolars. Half-round perpendicular tubes are soldered on the lingual of the first molar bands in

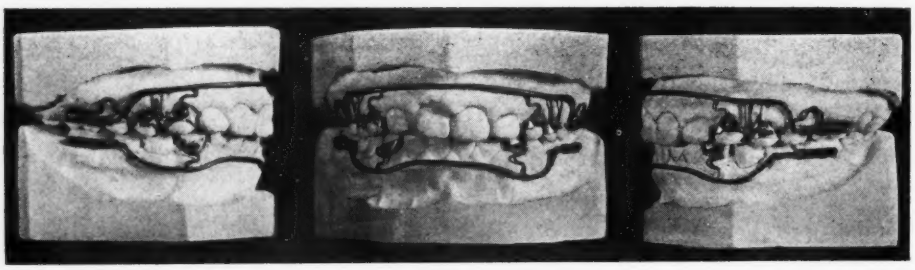


Fig. 3.

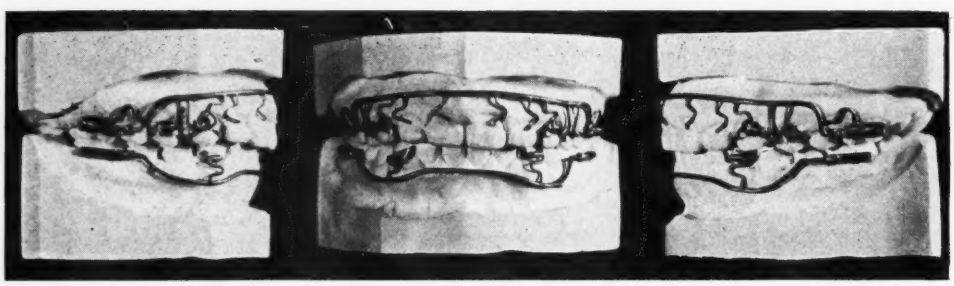


Fig. 4.

Fig. 5.

case it should be necessary to use a lingual arch. *Lower Lingual*—22 gauge wire inserted in horizontal tubes on canines, spur being soldered on wire mesial to tube on left side and free end bent at distal of same tube to hold in position. Opposite end passing free through right tube. With this part of the appliance the lower six anterior teeth are controlled by the adjustment of the

two lower labial canine finger springs. A removable appliance with lateral finger springs is in position on the first molars to control the expansion of the mandibular premolars.

Fig. 3. At this stage of the treatment the maxillary canines have erupted sufficiently to band; 22 gauge recurved finger springs are soldered in position

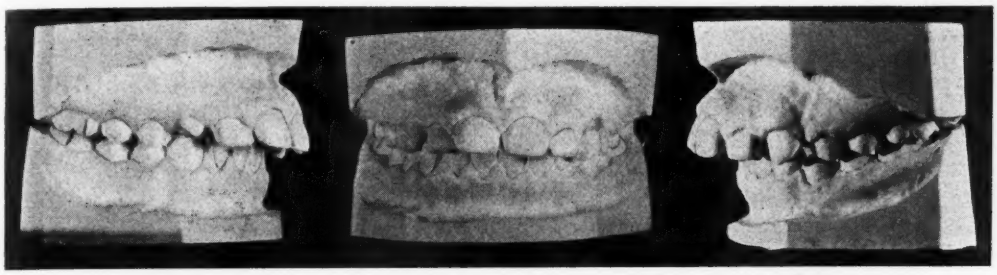


Fig. 6.

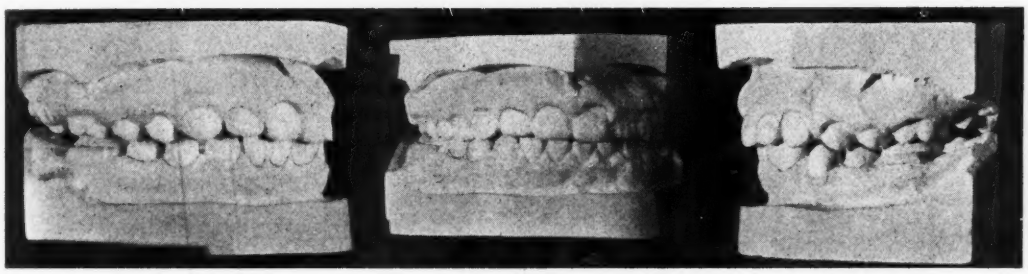


Fig. 7.

Fig. 8.

entering horizontal tubes on bands. This controls the elongation, rotation, and expansion of canines.

Fig. 4. After about eight months of treatment, when sufficient expansion had been gained in the maxillary canine and premolar regions, the four anterior 23 gauge recurved finger springs were soldered in place. With the greater length of spring in the recurved springs a greater range of adjust-

ment and a pressure lasting over a greater period of time was thought to be secured.

This case was under treatment eleven months and is not shown as a completed case.

Fig. 5 shows a photograph of the patient with appliances in place, demonstrating its inconspicuousness.

Fig. 9.

Fig. 10.

Fig. 6 shows the case at beginning of treatment. Fig. 7 shows the case at the present time.

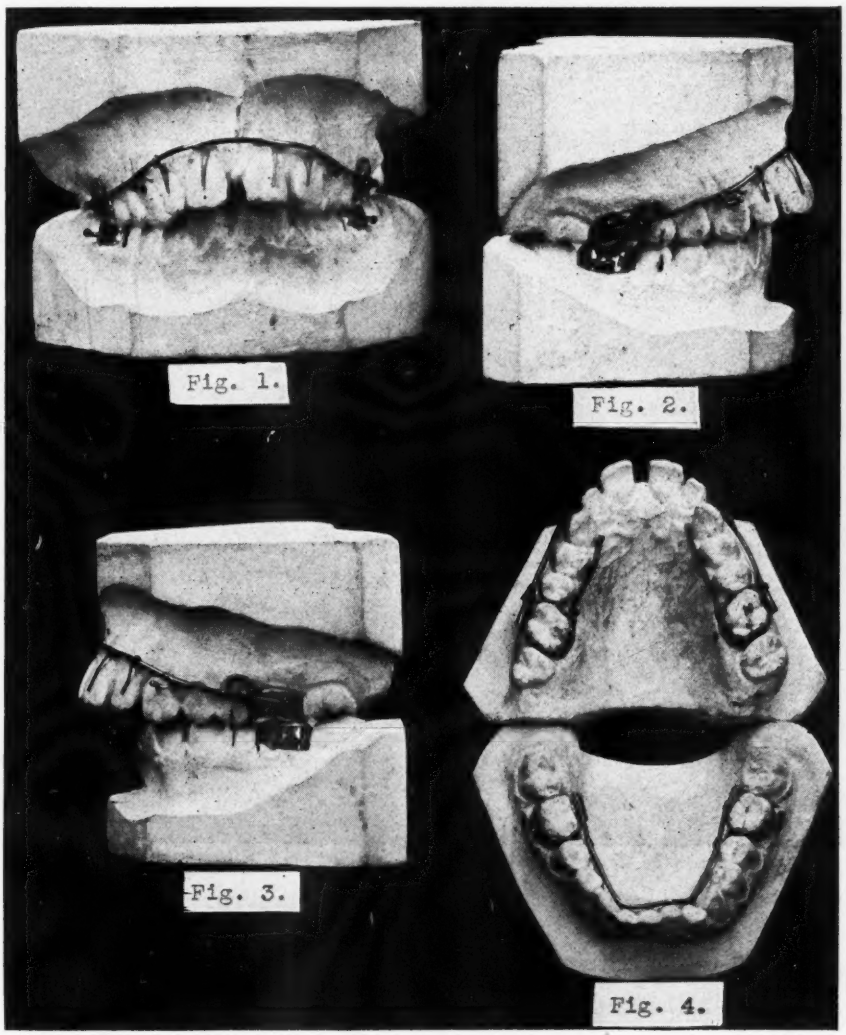
Fig. 8 shows upper and lower lingual views at beginning of treatment and at present time.

Fig. 9 shows the patient at the beginning of treatment, and Fig. 10 shows her at the present time.

CASE REPORT*

By P. R. Ashplant, D.D.S., Newburgh, N. Y.

IN RESPONSE to your committee's request to give a case report of a bilateral distal occlusion with labioversion of maxillary anteriors, this case was selected.



The point I wish to bring out is the simplicity of the appliance and ease in handling. It appears to me to be an appliance that is typical for the treatment of this type of case, taking all things into consideration. With the exception of having to rebuild the lower lingual after lining the mandibular

*Case report read before the Twenty-sixth Annual Meeting of the American Society of Orthodontists, Chicago, May 2-5, 1927.

teeth up, the appliances as shown were the only ones used in the treatment and retention of the case.

History.—Young lady of fourteen years, tonsils and adenoids out at nine, mouth-breather, but an exceptionally healthy type. Case was treated by general practitioner at the age of twelve. He reduced the labioversion of the maxillary teeth but did not attempt to correct the distal occlusion and naturally the teeth would not remain as corrected.

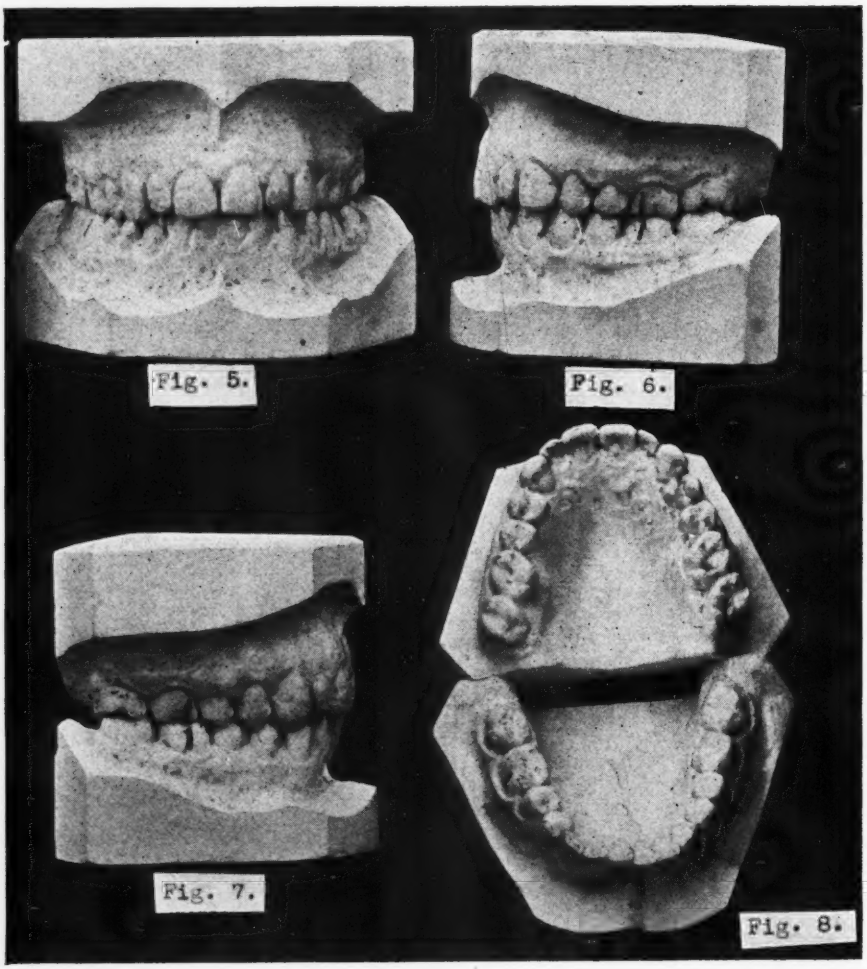


Fig. 1 shows the labial appliance with auxiliary springs to the four anterior teeth. Fig. 2 shows the right side; Fig. 3, the left side.

Fig. 4 shows the lingual view of the maxillary and mandibular appliance. Practically all of these cases require the rotation of the first mandibular molars, and that is the reason I have found these arms soldered to the molars and touching at the cervix of the canines, first and second premolars, so practical and useful. By rotating the molar with the labial arch, the arms swing out and give the necessary development in the canine and premolar region and incidentally retain them. Sometimes I find it necessary to band the canines, putting on a lingual spur over the arms. This stabilizes the appliance as well and keeps the arms from sliding down on the canine and tipping the

molars. These canine bands are removed when the distal occlusion is corrected. To avoid tipping of molars, premolars, and canines buccally, this development should be accomplished very slowly. In this case it was about eight months. Fig. 4 also shows the lower lingual with recurved auxiliary springs. These are under the body wire and cannot be seen in the slide.

Fig. 5 shows the anterior view of the finished case. Fig. 6 shows the left side with the premolars practically edge to edge. Fig. 7 shows the right side with typical occlusion. This is the relapse of the case, but it has stayed there for nearly two years and shows not the least inclination to go back any further. Fig. 8 shows lingual of maxillary and mandibular arches after retention has been removed.

A CASE HISTORY—EXCESSIVE OVERBITE IN THE PRIMARY DENTITION*

By Frank A. Delabarre, A.B., D.D.S., M.D., Boston, Mass.

M. *S.*, age five; height 40½″; weight 31.5 (36.5 = 13.6 per cent under weight); median line, O.K.; Bogue index, 28 mm.

Etiology.—Whooping cough; bottle-fed; defective heart from birth—"blue baby."

Classification.—I (Angle) characterized by excessive incisor overbite, 8 mm. No incisor spacing of mandibular incisors, and only slight in the maxilla. Soft tissues of the palate very sore, inflamed, and mastication practically impossible. Reverse curve of occlusion in maxilla and exaggerated curve in the mandible.

Line of Treatment.—Condition of palate demands immediate relief. Other orthodontic procedure postponed. Attempt to induce vertical growth of deciduous molars in order to reduce the overbite.

May 4, 1926.—Fig. 1 shows the occlusion on the left. Fig. 2, occlusal view of maxilla and mandible: note the area of irritation in the palate. Fig. 3, front occlusion; compare this with Fig. 4, front, placed in approximately normal overbite. The pencil mark indicates the 8 mm. overbite.

June 7, 1926.—Fig. 5 shows the left side in occlusion with the extension cap bands set on the maxillary left deciduous molars. Fig. 6, front, showing 4 mm. adjustment reduction of the overbite. Fig. 7, right, showing amount of opening *occlusion.*

June 14, 1926.—Note: Examination showed that the soreness of palate was gone and ability to masticate had been restored. The median lines of the incisors registered correctly and there was no tendency of the mandible to drift laterally, or anteroposteriorly. No lateral growth.

July 7, 1926.—Note: Good function maintained, everything favorable.

October 8, 1926.—Fig. 8 shows left occlusion (with bands in place). Fig. 9, right, showing occlusal contact of right molars. Fig. 10, front, showing the

*Case report read before the Twenty-sixth Annual Meeting of the American Society of Orthodontists, Chicago, May 2-5, 1927.

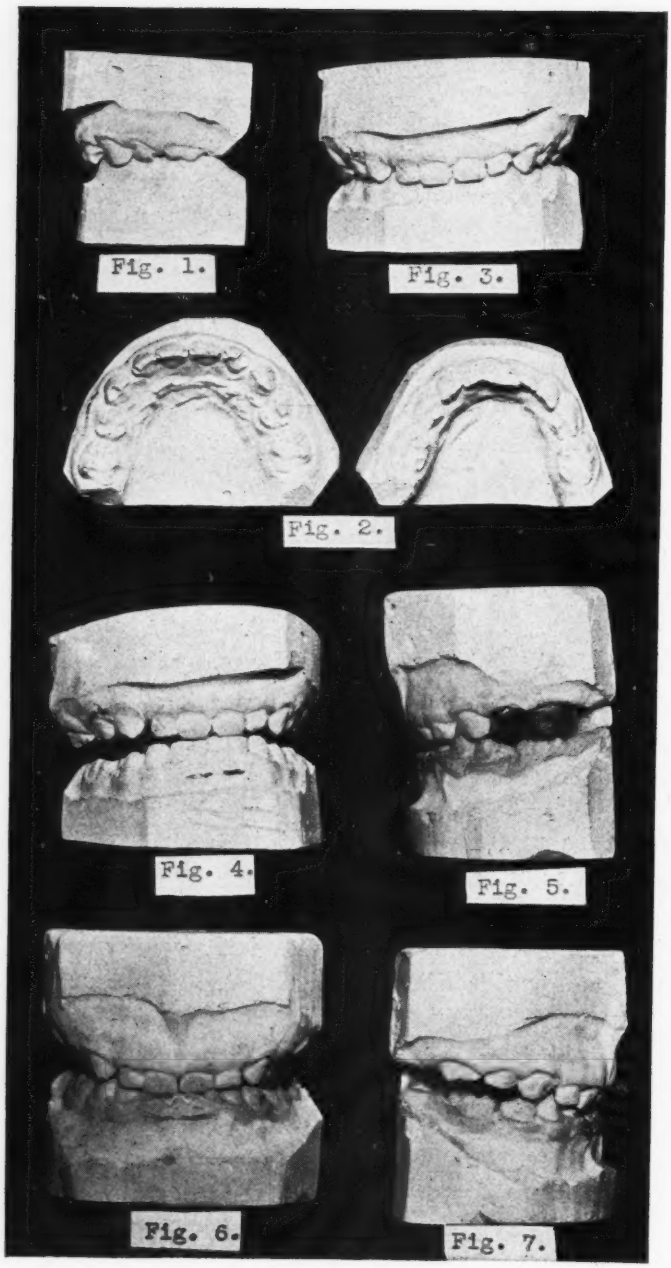
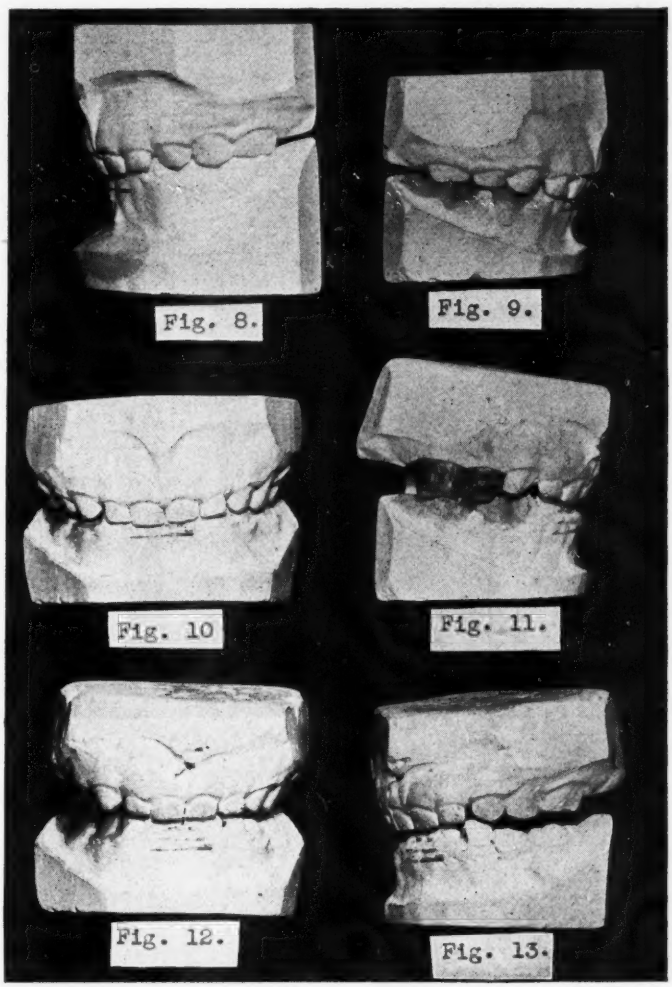


Fig. 1.
Fig. 3.
Fig. 2.
Fig. 4.
Fig. 5.
Fig. 6.
Fig. 7.

pencil mark of the original overbite with a possible gain of 2 mm. in vertical growth of the right molars and a probable depression of 2 mm. of the left-banded molars. *Note:* No soreness; good function.

December 5, 1926.—Fig. 11, right, similar bands set on the right molars to open the bite an additional 4 mm. Fig. 12, front. Note the lower pencil mark indicating the original overbite; the next above being the 2 mm. gain; the present adjustment of an added 4 mm. leaving only 2 mm. of actual overbite. Fig.



13, left (the original bands still in place), shows the amount of opening of occlusion.

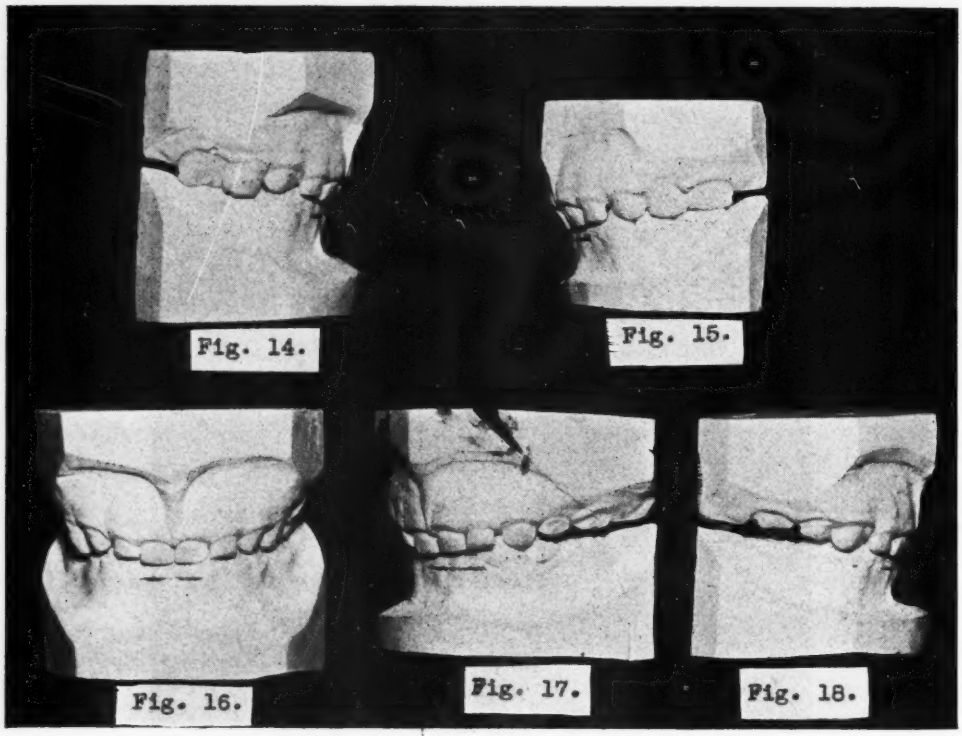
January 5, 1927.—Note: Examination shows a gain of 1.5 inches in height and 2¾ pounds in weight, or a gain of 1.5 per cent. Lateral incisor spacing beginning to show; all conditions favorable.

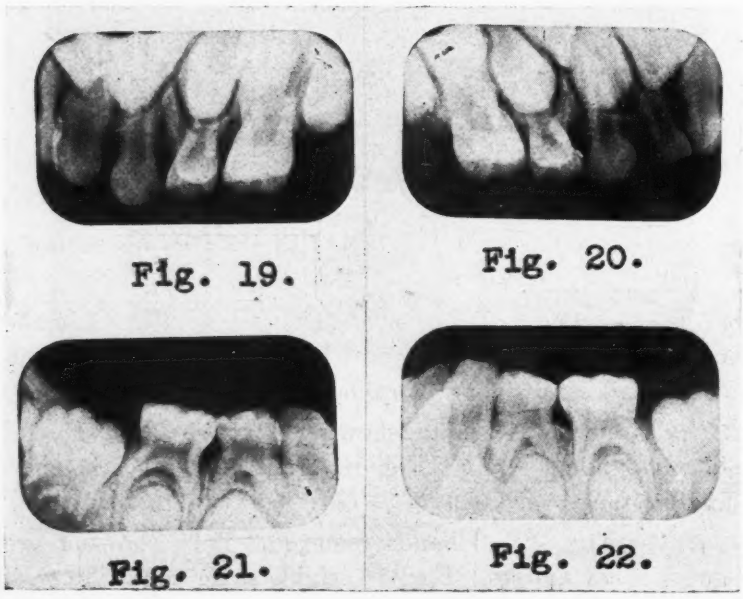
March 7, 1927.—Fig. 14, right, showing contact. Fig. 15, left, showing contact of old molar bands again. Fig. 16, front, showing first and second line of overbite and present overbite.

April 4, 1927.—Fig. 17, all bands removed. Left, showing present occlusion with depression of molars. Fig. 18, right, same condition. Figs. 19 and

20 show x-rays of molars showing no root absorptions. Figs. 21 and 22, x-rays of molars showing no root absorptions.

April 21, 1927.—Fig. 23. Maxilla, showing new expansion appliance, canine bands with bite planes to occlude with mandibular cuspids and soldered palatal loop expansion wire. Fig. 24, mandible similar, automatic lingual expansion appliance. Both adjusted for 2 mm. expansion in canine and second deciduous





molar regions. The bite planes open the bite again about 4 mm. giving all the molars a chance to elongate.

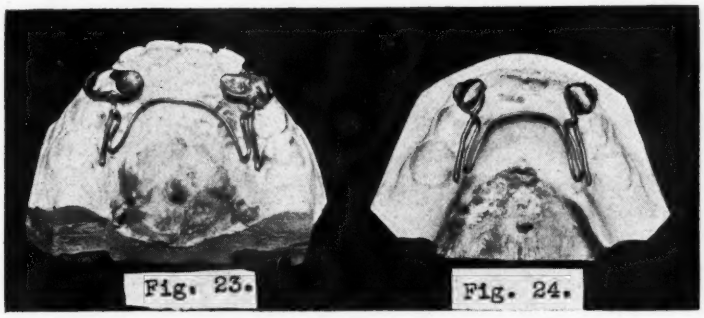


Fig. 23. Fig. 24.

April 28, 1927.—Height 42¼″; weight 34.5 pounds = 12.6 per cent underweight. Good occlusion—everything favorable. Maxillary permanent centrals erupting. First permanent molars will erupt soon. It is hoped that correct vertical relationships will be established permanently at that time.

Clinics

CLINICS*

By William C. Fisher, New York City

(a) Case Report—Unusual Movement of Central Incisor Toward Median Line Complicated by Supernumerary Teeth

PATIENT a boy fourteen years of age. Supernumerary tooth in the median line between the right central and left lateral was removed by Dr. Harold S. Vaughn. (Fig. 1.) The surgical operation was not extended to include the small supernumerary located in the median line of the hard palate (Fig. 2), and as this did not in any manner interfere with orthodontic treatment, the parents preferred not to operate further.

Treatment was instituted the latter part of June, 1925. Bands were placed on the first molars and labial alignment wire gauge 17 attached thereto.

Fig. 1.

Opposite the vicinity of the right premolar and the right lateral eyelets were soldered to the labial alignment wire to engage and direct ligatures. A band was fitted on the left central as well as was possible and an extension arm was soldered parallel to the longer axis of the root and extending as far up under the lip as possible. At the end of this arm an eyelet was soldered; ligatures were passed from this eyelet through the eyelet over the right lateral and through the eyelet over the right premolar and attached to the end of the buccal tube engaging the alignment wire. By placing the arm on the banded left central high up under the lip at a point about half way between the crown and the tip of the root the application of the force would better be directed, so as to obtain the bodily movement of the root of the

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

central. As soon as the tooth began to move, the length of the traction ligature was shortened and never carried after that time beyond the eyelet opposite the premolar region. The illustrations of the x-rays show how the central before treatment superimposed over the left lateral (Fig. 3) and the picture of the completed work although not ideal shows that the central has been brought into a rather satisfactory position (Fig. 4).

As early as November one of the parents desired the appliance removed because the boy in one of his games at school had accidentally cut his lip

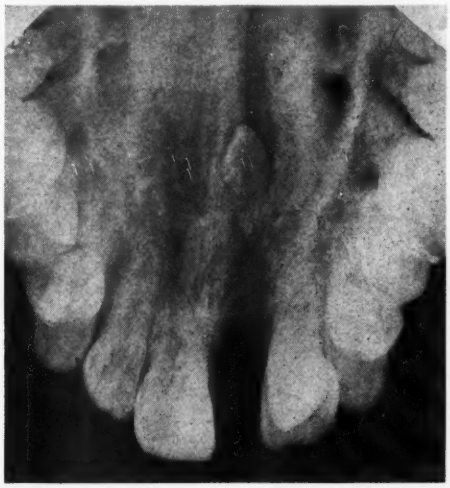


Fig. 2.

Fig. 3.

Fig 4.

on it. I persuaded the parents to permit the appliance to remain a little longer, but just before the Christmas holidays the parents stated that they were fully satisfied with the result accomplished in that time and again made strenuous requests to have the appliance removed, so that the boy could the better enjoy his Christmas holidays. Inasmuch as this was almost a charity case it was difficult to understand the sudden change of attitude in one of the parents; this interference accounts for the fact that we were unable to obtain an ideal result. I gained my point far enough to have a retention wire worn for an additional period of six months. The model shown (Figs. 5 and 6) was made one year after treatment was suspended

and six months after all retention was removed, and the x-ray illustration, Fig. 4, was taken at the same time. The central incisor was vital and no unusual sensation had been experienced by the patient although it is easy to see the great movement that was made in this tooth and in an apparently

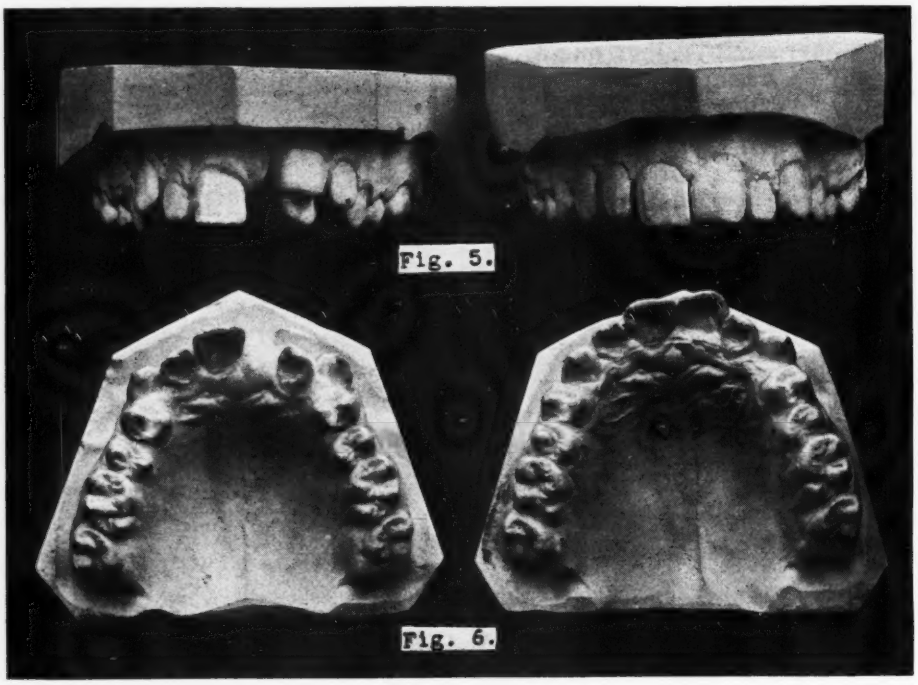


Fig. 5.

Fig. 6.

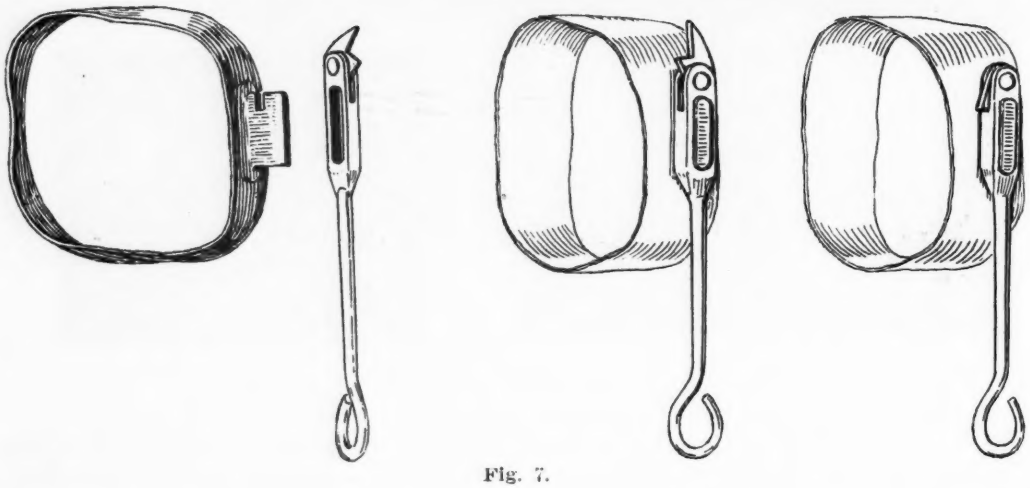


Fig. 7.

short time. Figs. 5 and 6 show two views of models made before treatment and one year after treatment.

(b) Improved Lingual Lock (Fig. 7)

The improved lingual lock shown here has but very recently been patented I am told under the name of the Linde Lock. I have used this lock now for about three years during its period of development and have found

it not only to be a satisfactory stable lock for lingual appliances but without a peer for mandibular appliances. Many of the lingual locks for the mandibular appliance so impinge on the soft tissue as to sometimes preclude the use of a lingual appliance. By the use of this lock the impingement on the soft tissue is practically entirely overcome. It is equally as satisfactory a lock for a superior lingual appliance, but its advantages in the upper jaw are not as marked as they are in the lower.

(c) Half Labial Appliance (Fig. 8)

This appliance as is shown in the illustration is of unusual value (in combination with the proper lingual appliance) to assist in the eruption and movement into alignment of unusually labially malposed canines. By its use

Fig. 8.

the *entire* labial arch is made unnecessary and frequently in patients of fourteen to sixteen years of age it will be found of advantage not to *display* a labial appliance. It will be noticed that two half-round tubes and pins are used in place of one in order to give the power arm a more rigid attachment. The appliance is run into place from the occlusal surface and fastened in the usual manner of the Mershon lock or Spencer lock. The power arm should be not less than a 17 gauge wire and so shaped that from its end may be directed the multiple coil spring gold wire of about 22 gauge. By having the multiple coil an additional spring force can easily be obtained and also an anterior and posterior direction of movement of the tooth is accomplished.

MOLAR BAND TECHNIC USING METAL TOOTH FORMS*

By James David McCoy, D.D.S., Los Angeles

ALTHOUGH the system represented by this clinic requires a great deal of work in its initial preparation, when once the foundation is laid, it is a great time-saver and greatly simplifies molar band procedure. It represents a series of metal models of the four first permanent molars. These are made in accurately graded sizes, eight models being made for each permanent molar.

In making the carvings of the original wax models, which were later cast in hard metal, an attempt was made to reproduce the full contour of crown and cusp, realizing, of course, that only an average could be attained, due to the natural variation found in different individuals.

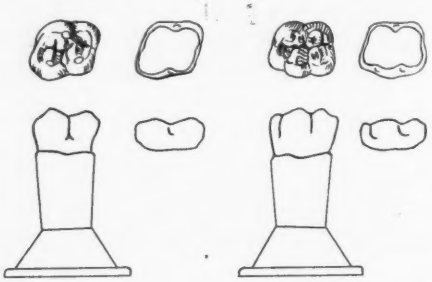


Fig. 1. Typical metal models showing the general character of crown and cusp formation as well as the metal bases which support them.

These twenty-eight metal molar teeth, each having an ample base, are mounted on a suitable block into which holes have been cut for the reception of the bases. Each metal model is fitted with a band which means that there is always available a stock of thirty-two molar bands in graded sizes; viz., eight for each first permanent molar which range in diameter from the smallest to the largest teeth encountered. It is only necessary in adapting them to the teeth to make very slight modifications, using Mershon contouring pliers and burnishers for this purpose. As fast as the bands are used, the office technician replaces them so that the stock is always kept complete. No attachments are soldered to the bands until they have been adapted to the teeth.

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

RESTORING FUNCTIONAL ACTIVITY*

By T. M. Robertson, D.D.S., Coffeyville, Kansas

THIS appliance is not intended as a panacea for all mouth-breathers. Its use is indicated in those cases of failure of normal development of the nose, caused from lack of normal function of breathing, extending over a prolonged period of time—the collapsed nares type.

Fig. 1 shows a photo of the nose and the appliances, showing the steps in construction.

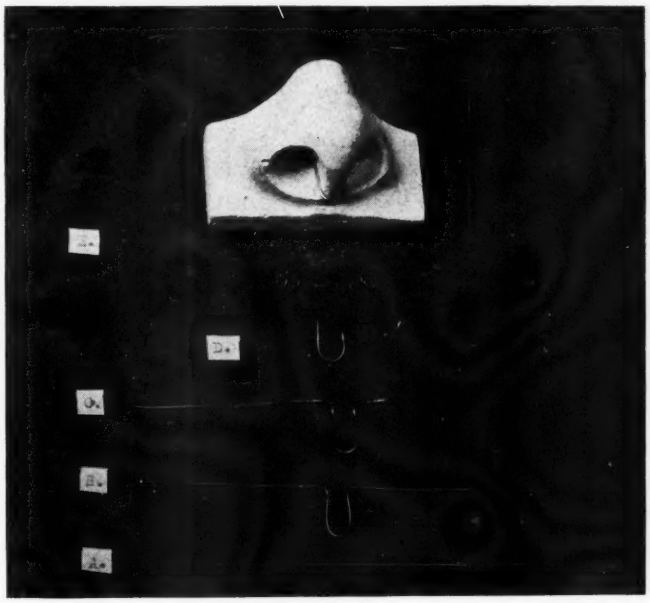


Fig. 1.

This appliance is intended for use during the sleeping period to aid in establishing and maintaining gains made in breathing exercises and to aid in assisting the patient to get back to normal breathing.

It is inconspicuous and can be used by the hay fever type at any time.

Construction:

(A) Material. A four-inch piece of any spring metal wire. If made of nickel silver, should be gold plated. 22 gauge or smaller.

(B) Technic. It is not practical to make appliance over model. Must be made free hand, making the U about the center long enough to be stabilized by slight pressure on each side of septum.

(C) Make bend slightly downward, across floor of nose, upward as shown in Fig. 1 (*C*) at left side.

*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

(D) At this stage it is well to fit U in position and estimate position of end loops by first partially adjusting them on the outside of the nose, then condensing the appliance and making trial fit inside.

Caution: Do not allow parts to extend far enough to come in contact with middle concha.

You may find this appliance an aid in some of those stubborn cases where the cooperation of the patient, the services of the rhinologist, or prayer has been of no avail.

A SIMPLE METHOD FOR HARDENING RECORD MODELS*

By Ashley E. Howes, D.D.S., New Rochelle, New York

IT IS conceded that plaster reproduces detail with much greater accuracy than does artificial stone, but because of the relative weakness of plaster, many men are now making their orthodontic models, or at least the anatomic portion, of stone. The sole value of the stone is its hardness. An ideal orthodontic model would be one which contained all the detail of a plaster model, and the hardness of a stone model. The method here described for treating a plaster model does not make the plaster as hard as stone, but it does greatly increase the surface hardness of the model.

The models are planned in the usual manner and allowed to dry thoroughly. They are then immersed in a boiling solution of borax and water. The strength of this solution should be approximately one part borax to six parts water, that is, if a quart of water is used, five ounces of borax should be added to it. The models are gently boiled in this solution for about fifteen minutes. They are then removed and immediately washed off in running water. They are then allowed to dry. Care must be exercised that no dirt or dust comes in contact with the models during the entire procedure. As said before, the hardening of the models seems to be a surface-hardening only, penetrating to a depth of not over a millimeter and a half, but this seems to be a great protection against breakage of the cusps and incisal edges of the teeth.

Regarding the chemistry of the process, there are several possibilities, one of which is as follows:

Plaster of Paris, after setting has the formula $CaSO_4 . 2H_2O$.

This material tests 1.5-2.0 in hardness (as compared with a diamond). If this material is boiled in a concentrated solution of a salt, such as borax ($Na_2B_4O_7 . 10H_2O$) the plaster is dehydrated, leaving calcium sulphate without any molecules of water of crystallization.

This new substance, $CaSO_4$, formed on the surface of the models, tests 2.5-3 in hardness, or about twice as hard as the original plaster.

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*Clinic presented before the Twenty-sixth Annual Meeting of The American Society of Orthodontists, Chicago, May 2-5, 1927.

DEPARTMENT OF
ORAL SURGERY, ORAL PATHOLOGY AND SURGICAL ORTHODONTIA

Under Editorial Supervision of

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DIAGNOSIS AND TREATMENT OF ACUTE AND CHRONIC OSTEOMYELITIS OF THE MANDIBLE AND MAXILLA*

By Sterling V. Mead, D.D.S., Washington, D. C.

THERE has been a vague discontent and dissatisfaction in the minds of many of us regarding certain systemic disturbances which are apparently caused by some bone disease with ill-defined symptoms and which our methods of diagnosis often fail to disclose. Your attention is, therefore, directed to a phase of a disease which will no doubt occupy more and more of our attention as we study it. A search of dental and medical literature will reveal a wealth of material upon the subject of acute osteomyelitis of the jaws; but while some few individuals seem to be familiar with a chronic phase of the disease, its common occurrence is undoubtedly not usually recognized.

In a recent series of one hundred cases of chronic osteomyelitis studied by the author, sections of tissue were sent to a number of leading pathologists for examination, and this diagnosis was confirmed in all cases.

Osteomyelitis is an inflammation of the bone marrow, or of the periosteum, the cortex and the marrow. It may be either acute or chronic. The acute form is characterized by fever, chills and general debility and attended by suppuration with rapid destructive progression. The chronic form results in rarefaction and condensation of bone. Pain or other alarming local symptoms may or may not be present. There is one type of chronic osteomyelitis where there is usually no pain or any definite local symptom.

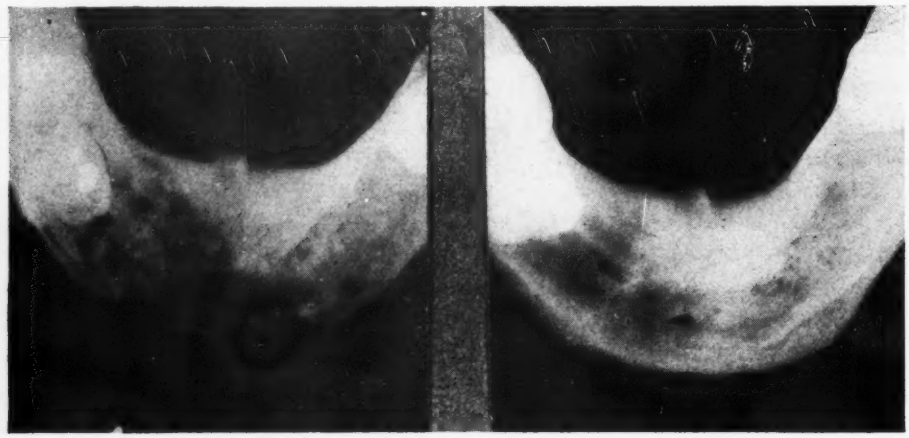
Inflammatory reactions of the maxillary bones may be classified according to the anatomic situation of the lesion into three divisions:

1. Periostitis, inflammation of the surrounding membrane of the bone or periosteum.
2. Osteitis, inflammation of the bone structure proper.
3. Osteomyelitis, inflammation of the medullary cavity.

*Read before the Section on Surgery, District Medical Society, Washington, D. C., February 20, 1928.

It is important to realize that in practice no such definite anatomic limits to the inflammation exist. Where the periosteum is inflamed, the underlying bone is always affected to a greater or less extent, while disease involving the medullary cavity invariably affects the bone surrounding it. In a similar way, if the bone itself is first affected, either the periosteum or medullary cavity, or both, is soon involved.

The development and structure of the long and flat bones of the body are similar. Each consists of a dense outer cortex, surrounded by a highly vascular membrane, the periosteum, and having on the inside a more spongy, diploetic layer, more richly supplied with vessels than the outer denser layer. The flat bones, however, do not have the actual channel, filled with marrow, as do the long bones.



A. *B.*

Fig. 1.—*A*, Radiogram of acute osteomyelitis of the mandible in a man seventy years of age. The area began on a central tooth, which had a small area of periapical osteitis. Within a few days all of the anterior teeth were loose and easily removed. There was a carbuncle on the chin. *B*, Radiogram of same case one year later. I treated the patient for nine months, and all sequestra were allowed to be exfoliated. Complete regeneration is shown. The ridge is not unlike that of a normal condition after removal of the teeth. He later wore a plate without any inconvenience.

ETIOLOGY

The portals of infection in either long or flat bones are: first, through the blood or lymph channels directly to the medullary structure; not so frequent in flat, as in long bones; second, by an origin beneath the periosteum; and, third, by direct inoculation by trauma.

Osteomyelitis is due to the presence of one or all of the following: staphylococcus, streptococcus, pneumococcus, bacillus coli communis. The disease may be hematogenous in origin or it may be caused by infection from the teeth or their surrounding structures. It may be primary or secondary. Resistance of patient is of more importance as an etiologic factor than the virulence of the infection.

Osteomyelitis of the jaws may develop as a result of procrastination or misdirected treatment. It may result from acute periapical or periodontal infection, or a pericoronal area surrounding an impacted or unerupted third molar and especially of the mandible. The lower third molar is a prolific

source of osteomyelitis. It may occur as an initial acute infection or as an acute flare-up of a chronic infected area.

Many cases develop after the extraction of teeth with acute symptoms of swelling, pain, and pus where free open drainage is not established and maintained long enough. Other cases develop where teeth are extracted and other adjacent teeth with periodontal and periapical bone areas are left, thus traumatizing an infected area and leaving it without treatment.

Fig. 2.—*A*, Extraoral radiogram showing two sequestra resulting from acute osteomyelitis of the mandible. *B*, view showing the same case after removal of the upper sequestrum. The lower sequestrum was later removed.

Traumatic injury to the bones, such as fracture, often results in osteomyelitis. It is claimed that injection of an anesthetic agent into inflamed areas or the indiscreet use of hydrogen peroxide may cause osteomyelitis.

General diseases, such as tuberculosis, syphilis, anemia, and acute exanthematous fevers (measles, scarlet fever, etc.) may interfere with the nourishment of the bones and give opportunity for the entrance and growth of pyogenic microorganisms.

Poisons such as mercury, arsenic, cocaine and phosphorus or radioactive substances used in the manufacture of luminous watch dials, etc., may cause periostitis and osteomyelitis either by their direct action or by so lowering the resistance of the tissues that pyogenic bacteria gain entrance. Mercury may cause osteomyelitis in those who work with the metal, or the disease may be a late stage of the stomatitis that follows overdosage of the drug. Arsenic and cocaine may cause direct poisoning of the tissues when applied locally as therapeutic agents. Phosphorus causes osteomyelitis of the jaws in workers in the manufacture of matches who pay little or no attention to hygiene of the mouth. The phosphorus in solid form or its fumes probably gains entrance to the jaw bone through devitalized pulps of carious teeth or through an inflamed periodontal membrane.

Fig. 3.—Extraoral radiogram showing acute osteomyelitis of the mandible, with the typical honeycombed condition following the lower border of the mandible, instead of in the region of the teeth as is usually the case.

It would appear that in many cases of osteomyelitis the condition could be avoided by early incision of acute conditions, or early removal of infected teeth. Acute osteomyelitis, however, in many cases occurs as a result of lowered local or general resistance and in these cases the disease may develop regardless of the most careful treatment.

Chronic osteomyelitis may be caused by portions of broken-off roots, foreign bodies, residual infection which has remained in the bone after the removal of the cause, or any form of irritation or low grade infection.

My experience with roots which have remained any appreciable length of time in the bone after extraction, has been the finding of a definite chronic osteomyelitis. In many cases the radiogram does not show a definite rarefied area, but upon examination during the surgical removal of the roots there is

found a honeycombed condition, which is spongy and easily removed with a curette or other instrument.

A.

B.

Fig. 4.—*A*, Acute osteomyelitis and spontaneous fracture in boy six years old, following removal of a tooth and acute cellulitis of a month's duration without drainage. Radiogram taken when patient presented himself to me for treatment. The premolar teeth were loose and spontaneous fracture had occurred, leaving a space at the two ends of the bone of about half an inch. While the molar appears to be erupted, it was still covered by soft tissue. *B*, Radiogram taken two years after beginning of treatment with complete regeneration of bone.

Acute osteomyelitis occurs very rarely in the maxilla, but is usually confined to the mandible. This is no doubt explained by anatomic considerations. The cancellous nature of the superior maxilla favors early drainage and re-

covery, and probably not more than 1 per cent of the cases occurs here. In the mandible an entire shell of new bone may be formed about the sequestrum. Chronic osteomyelitis may be found in both the maxilla and mandible. In the maxilla the infection may gain entrance through the nasal mucosa and maxillary sinus. Likewise, a chronic osteomyelitis of the maxilla may readily involve the maxillary sinus. A chronic osteomyelitis of the walls of the maxillary sinus is not uncommon, and is very difficult to diagnose. Undoubtedly this chronic condition of the walls of the maxillary sinus is the starting point of many acute flare-ups after removal of teeth. It may be due to an extension of periapical, periodontal or pericoronal disease which may occur either directly or from a thrombophlebitis. In many cases, even though edentulous, there may be residual infection in the maxilla where infected teeth

Fig. 5.—Acute osteomyelitis of the mandible.

have been removed and the diseased area not completely removed, which may become occluded by cellular proliferation and the infection locked in, and the same environment established for anerobes as existed previously.

SYMPTOMS

Acute osteomyelitis may be subdivided into a localized or circumscribed variety, or the spreading variety. In the localized or circumscribed type there is very little tendency for the disease to spread, and recovery follows promptly after incision and drainage. In the spreading variety the tendency of the disease is to spread in spite of all treatment.

The onset of acute osteomyelitis is rather sudden, following a blow or injury to the bone, or acute infection, and there is usually a severe chill and later a varying temperature from subnormal to from 102° to 104° F. The patient complains of intense, excruciating pain. The pulse is rapid and soon

becomes weak. The pain is deep-seated and there is marked tenderness over the affected area. The affected side of the face becomes greatly swollen, and trismus often occurs because of the involvement of the muscles of mastication.

As the inflammation progresses, these symptoms become more pronounced and the swelling extends to the neighboring cellular and glandular tissues, with extreme tenderness of the entire region. Examination of the blood usually shows a leucocytosis with a relative increase in the polymorphonuclear leucocytes. The tongue is dry and coated.

Fig. 6.—Extraoral radiogram showing spontaneous fracture, and sequestrum formed, as a result of osteomyelitis. In removing the diseased tissue and the sequestrum, both ends of the mandible showed clearly the line of demarcation.

In the beginning there is usually no appearance of pus, but the symptoms are usually well marked within a few days. In many cases the teeth are loosened in the inflamed area. The intense and severe pain is usually localized at first but is later referred over the entire bone and is usually worse at night when the temperature rises. Pain is always greatest where there is tension from pus, and when this burrows through the bone and is distributed under the periosteum the pain is relieved until there is more pressure or tension. The pus eventually evacuates intraorally or extraorally, following the path of least resistance.

In advanced osteomyelitis the radiogram shows the exudative and sclerotic changes of periosteitis and osteitis, and also changes due to bone

destruction, there being present well-marked abscesses and cavities, and in the older cases, sequestra are seen.

The pain is of a very severe nature, which increases as pus forms and is relieved when pus is evacuated. The temperature curve follows these symptoms, the temperature usually being the highest when the pain is most severe.

Spontaneous fracture may occur as a result of extensive osteomyelitis. The necrosis may be slight in extent or it may involve the whole bone.

Pus developing on the lingual side of the mandible causes the characteristic swelling of the submental region and immobility of the tongue and makes speech difficult. The lymph glands become enlarged and sensitive to palpation. An infection of the mandibular incisors drains to the submental lymph glands, while infection of any of the other teeth affects the submaxillary glands.

Chronic osteomyelitis is characterized by long-continued inflammatory process with alternating areas of bone destruction and bone formation. The process is an insidious one, and the symptoms are usually so slight or so ill defined that the patient is not aware of any pathology.

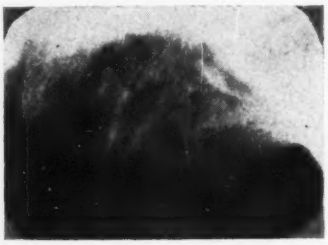


Fig. 7.—Intraoral radiogram showing acute osteomyelitis of upper cuspid and bicuspid regions.

In the type of chronic osteomyelitis following an acute osteomyelitis, bone destruction is the important pathologic process—a necrosis that goes on, often over a period of years, to the production of sequestri of various sizes. This necrosis is associated with, and is the essential cause of, continued suppuration.

A low-grade bone infection that forms little pus, more or less pain, and a variable amount of swelling may attack some part of the jaws or may attack different parts of the same jaw or both jaws simultaneously or consecutively. This may continue for a long time without coming to any definite conclusion or without showing any very definite head for surgical attack, except that a piece of bone may be sloughed or a tooth lost.

DIAGNOSIS

An important diagnostic point is that there is an early period in acute osteomyelitis when the pus has not caused apparent bone destruction and the radiogram will not show any variation from the normal. Diagnosis of acute osteomyelitis cannot, therefore, be made from the radiogram alone. As the inflammation increases, abscess cavities and areas of bone destruction are shown on the radiogram.

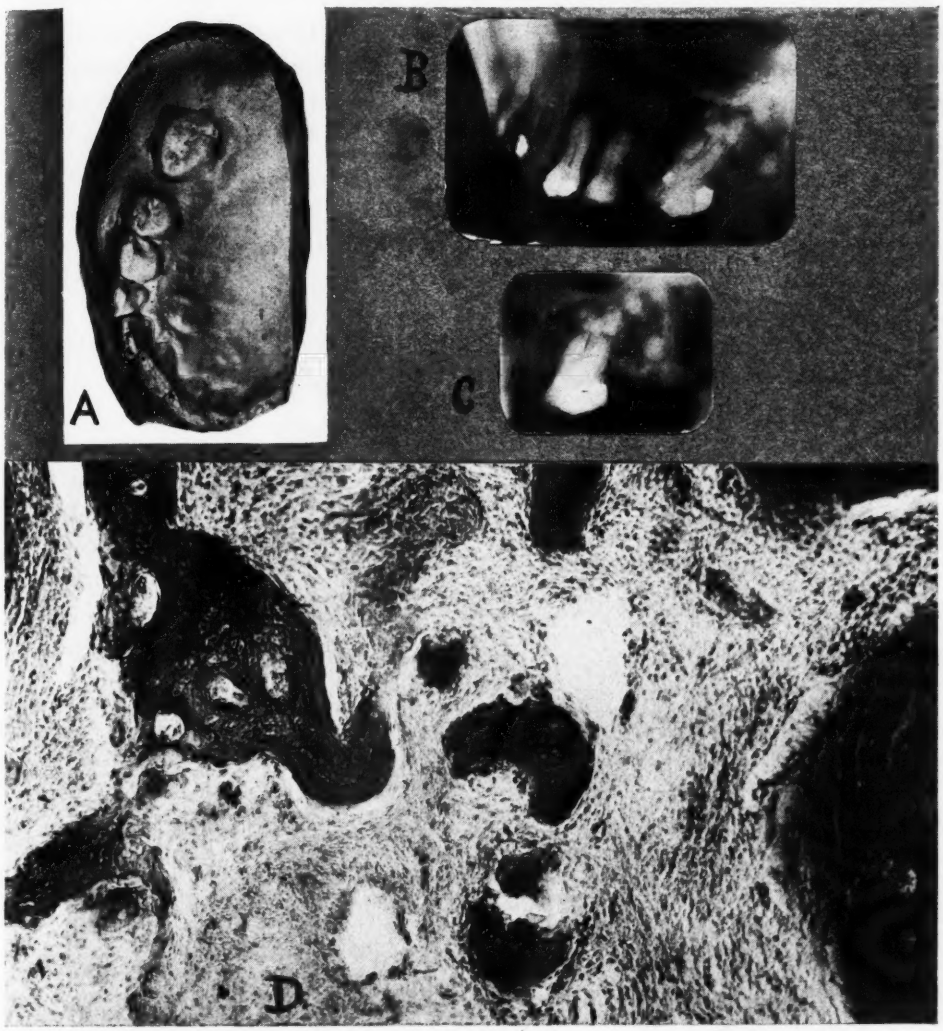


Fig. 8.—Chronic osteomyelitis of upper biscuspid and molar regions. *A*, Photograph of impression of the mouth showing bulging in the premolar and molar regions. *B*, Intraoral view showing honeycombed condition with areas of rarefying osteitis and osteosclerosis. *C*, Small intraoral view showing molar region. *D*, Photomicrograph. Section made through the decalcified tooth and its accompanying attached alveolar processes shows considerable thickening of the cancellated trabeculae with narrowing of the Haversian canals and the bony lacunae, accompanied by a very marked fibrosis of the tissue of the cancellated marrow spaces. The periodontal membrane is markedly thickened and sclerotic. In certain areas throughout the marrow spaces of the bone there is evidence of a low grade chronic inflammation characterized by patchy round-celled infiltration and endothelial proliferation of the preformed blood vessels. No evidence of any malignant change can be demonstrated. The microscopic picture is that of a chronic plastic sclerotic process resulting from chronic irritation of long standing.

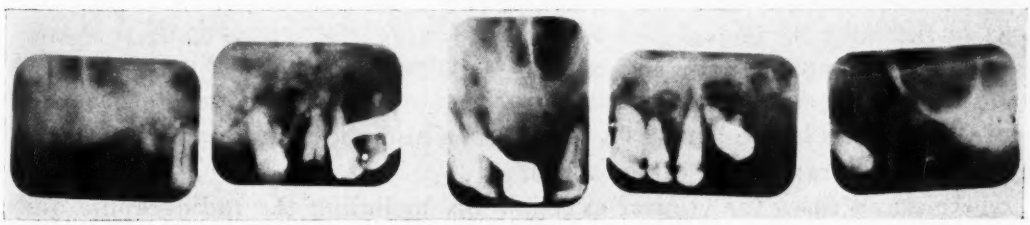


Fig. 9.—Intraoral radiograms of the upper teeth and maxilla, showing chronic plastic, sclerotic process resulting from long continued irritation of chronic osteomyelitis.

As the acute condition progresses, the radiogram within a few days of onset will show the bone destruction, and the well-marked abscess cavities due to necrosis are seen. The tendency of the disease is to destroy first the organic structure, leaving some of the inorganic material or framework, giving the diseased area a worm-eaten appearance.

In chronic inflammation of the bone marrow, disintegration or caries of the bone results. During this chronic course new bone formation takes place, some of the new bone being denser than normal, and areas of bone resorption and new bone formation may alternate, giving the bone a ragged or "moth-eaten" appearance.

In chronic osteomyelitis, the radiogram may disclose alternating areas of bone destruction and bone formation. The areas of new bone formation are denser than normal bone.

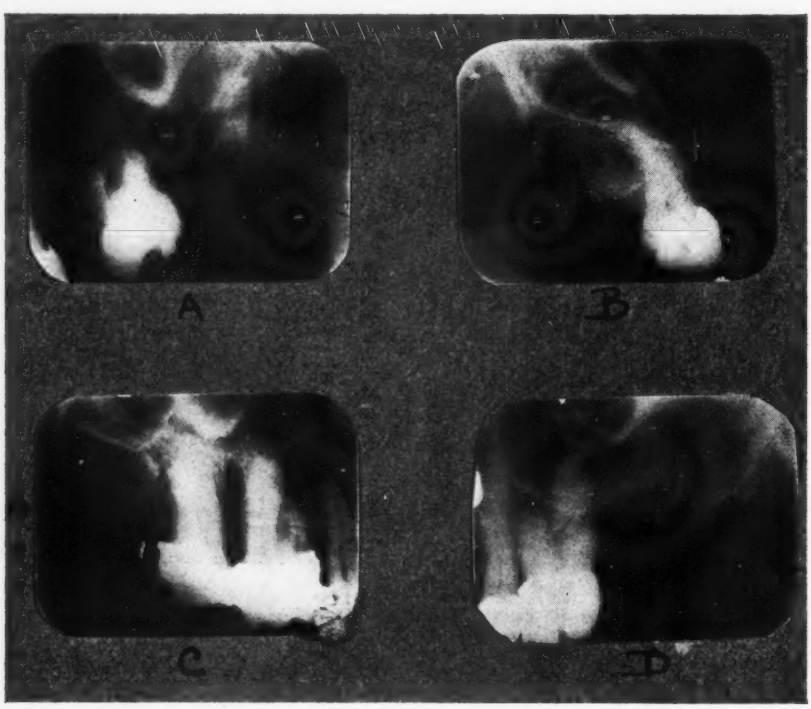


Fig. 10.—*A*, Radiogram showing chronic osteomyelitis of the tuberosity region of the maxilla. The new bone had a chalk-like consistency. *B*, Radiogram showing chronic osteomyelitis in third molar region of maxilla. Two molar roots are shown and no definite bone pathology is disclosed. The bone around the roots was found to be definitely honeycombed and diseased. *C*, Radiogram of maxillary third molar region, showing osteoporosis and osteosclerosis as a result of chronic osteomyelitis. The bone was found to be definitely honeycombed. *D*, Radiogram of the maxillary second molar region showing rarefying osteitis as a result of chronic osteomyelitis.

As infection spreads, the calcium salts are relatively slowly absorbed, and as the infection extends, islands of bone are left between the areas of infection. The bone changes in the maxilla and the maxillary sinus are not usually radiographically diagnostic.

In many cases the clinical examination, including the radiographic, fails to disclose any apparent abnormality, and the disease is discovered by symptoms expressed by the patient, or the radiogram may disclose suspicious areas, which require an exploratory operation to determine whether or not there is

actual pathology. In many cases the radiogram will show what is apparently normal bone, with a very cancellous nature or not as dense as the average normal case, or the radiogram may disclose roots or small areas of osteosclerosis. On opening into these areas the condition is often found to be much worse than shown, as the tissue may be very soft and spongy and easily scraped with a curette. The area has a honey-combed appearance and consists of a bone framework without any bone consistency or body. Upon removing this tissue, a watery, yellowish brown serum is seen to exude. I have found this condition to occur invariably around pieces of root left in the bone.

Fig. 11-*A*.

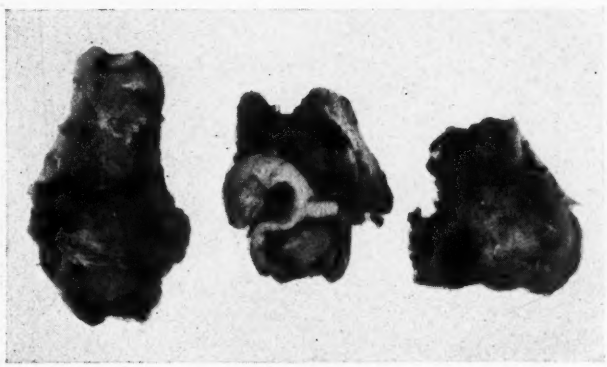


Fig. 11-*B*.

Fig. 11-*A*.—Model showing hypertrophy in the maxillary right third molar region.
Fig. 11-*B*.—Tooth and diseased bone removed from area shown in Fig. 11-*A*.

The writer feels the necessity of pleading for extreme care and discrimination in the diagnosis of chronic osteomyelitis. Many instances have come under observation in the past where diagnosticians have been too eager to discover pathology and discovered areas that were not at all apparent to the writer. It would be far better that all chronic osteomyelitis should go unrecognized than that this opportunity be seized upon by any radical element who would become so enthused that it could discover pathology in all normal bone areas where teeth have or have not been removed.

PROGNOSIS

The prognosis of acute osteomyelitis is always serious. The seriousness depends upon the type of organism, resistance of patient, age, amount of bone

involvement, and whether the infection has a tendency to localize or become diffuse. While in most cases, the results are not serious so far as life is concerned, the mutilating character of the disease is to be considered always. More dangerous still than the bone condition, from the standpoint of life and death, is the type or character of the soft tissue involvement, as a septicemia or pyemia is to be more feared than the bone disturbance.

TREATMENT

Infected teeth which cause, or influence, the progress of osteomyelitis should be removed. In some cases it may be necessary to incise and drain and remove the tooth or teeth later, and in other cases it is just as well to remove immediately. This will depend upon the conditions.

Fig. 11-*C*.—Lateral radiogram showing the area of chronic osteomyelitis shown in Fig. 11-*A*.

There is a great difference of opinion regarding the removal of teeth during acute infection. I would not think it proper to endeavor to standardize a procedure of this kind. I believe that each case presents certain difficulties and the question of extraction can best be determined by the operator at that time.

The mouth should be cleared of roots, loose teeth, and other sepsis. It is well, however, in this disease, as at all times, to endeavor to get any tooth past the acute stage before extraction, more on account of the soft tissue involvement than that of the bone. Most teeth showing acute periapical and

periodontal symptoms can be relieved of the acute symptoms by treatment or by incision and drainage. Where teeth are removed in osteomyelitis, large free openings should be made into the bone and the area packed with gauze and changed at least twice a day, or a rubber drain tube should be inserted and the wound irrigated thoroughly with aromatic chlorazene or normal saline solution.

Fig. 11-*D*.—Photograph of tissue, Fig. 11-*A*. Low magnification.

I do not hesitate to remove teeth during acute stage of periapical or periodontal infection, but I do take certain precautions. Where there is an acute condition and the patient's general condition is very bad, I would first cooperate with the physician and endeavor to incise the soft tissue, open the canal in the case of periapical infection, or the pocket in the case of periodontal infection.

Where there is a local lesion of a general septicemia, infected teeth should not be removed. Teeth bordering the maxillary sinus with acute conditions should be removed only as a last resort on account of the danger of pansinusitis and brain abscess.

Lower third molars should usually be treated where the condition is acute as there is great danger of removal during acute stage. Acute cellulitis or osteomyelitis may follow, or peritonsillar abscess, etc.

It is occasionally necessary, however, to remove the third molar during the acute stage, but the infection should be allowed to localize as much as possible.

Fig. 11-*E*.—Photograph of tissue, Fig. 11-*A*. High magnification.

Aeration and drainage have a tendency to limit acute osteomyelitis. This is often difficult in the mandible and usually simple in the maxilla, which no doubt accounts for the fact that most cases of acute osteomyelitis of the jaws occur in the mandible and comparatively few in the maxilla.

In many extensive cases of the mandible an incision should be made under the inferior border of the jaw and a large opening made for drainage. This should be kept open by drain tube or gauze. In many cases it is best to make incision both inside the mouth and outside, and establish through and through drainage. Force in irrigation should be avoided. The tube should be kept clean, or if the gauze is used, it should be removed every twelve to twenty-four hours. The tube is preferable where there is free flow of pus.

The gauze is more useful in cases of chronic osteomyelitis following the acute condition, or of pathologic fracture. The amount of the gauze should be gradually decreased and the wound allowed to heal in with granulation tissue, and splints should be used to keep the parts immobilized.

In extreme cases where it is not possible to reach the pus from within the mouth or through incision on the outside, holes may be drilled into the lower border of the mandible for evacuation of the pus. Free and permanent drainage should be established, as it is sometimes necessary to treat aggravated cases for months.

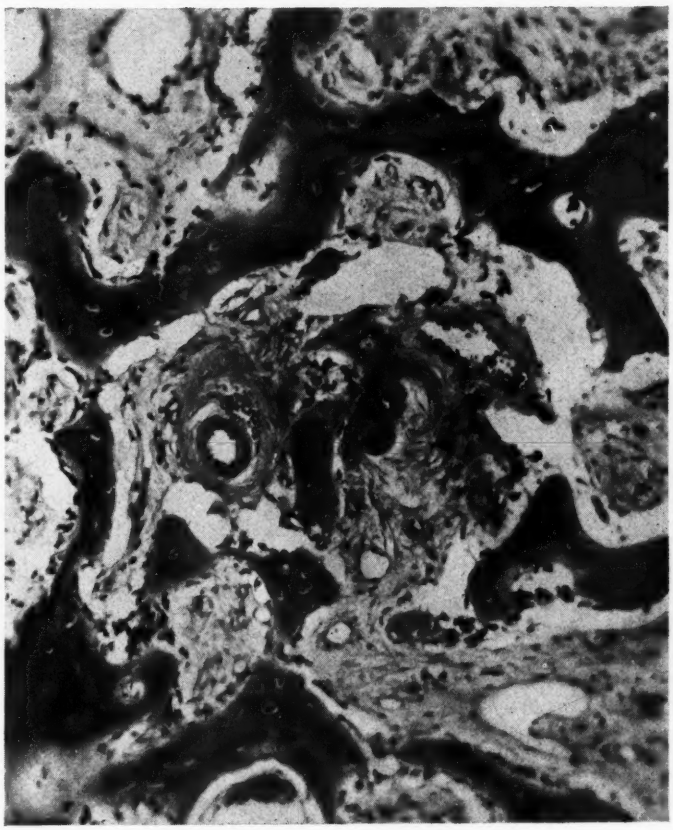


Fig. 11-*F*.—Photomicrograph of tissue. Fig. 11-*A*. High magnification (x240).

One should wait until a sequestrum has actually formed before operating on the bone. While adequate drainage of the soft parts should be made immediately, there should be no cutting or curetting of the bone until actual sequestration occurs. In such cases radiography at intervals is, of course, very helpful.

The patient's resistance can best be benefited by rest, quiet, careful nursing, and diet. Hospitalization is advisable, so that the various hospital, laboratory, and operating room facilities may be available.

The diet should receive particular attention, as the patients should receive plenty of nourishment to raise their resistance. Tonics and forced feeding may be necessary. Liquids should be given every two to three hours.

A fluid diet is prescribed during the acute stages, consisting mainly of fresh fruit juices, such as orange juice and lemonade, as well as milk and eggs in some form. Later on, fresh vegetables and cereals are added.

An effort should be made to provide an excess of alkaline, since so-called acidosis or lowered alkalinity may be present. Milk will provide for the calcium deficiency to some degree as well. Citrus fruit juices, particularly orange juice, should be abundantly provided, as well as tomatoes, either canned or raw, and other vegetables. The citrus fruits tend to alkalinize as well as to provide vitamines. Cod liver oil may be given.

Fig. 12-*A*.

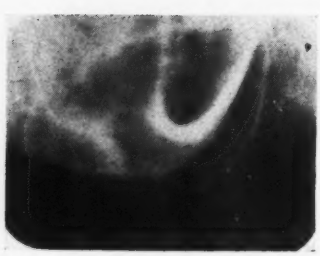


Fig. 12-*B*.

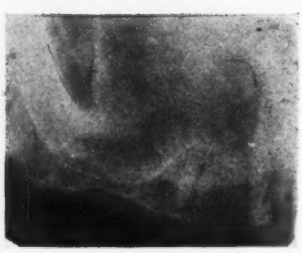


Fig. 12-*C*.

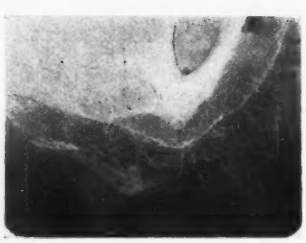


Fig. 12-*D*.

Figs. 12-*A* to *H*.—Chronic ostetitis and osteomyelitis. Sections from this tissue show a thickening and distortion of the lamellae in certain areas with rarefication and necrotic and necrobiotic changes in others. In the latter areas many of the lacunae are quite large, and contain pignotic dead bone cells, the outlines of the canaliculae having disappeared. The contained cancellous marrow spaces in many areas exhibit a typical plastic process with areas of patchy round-celled infiltration, endothelial proliferation of many of the smaller blood vessels to the extent of complete endarteritis and endophlebitis obliterans. This is accompanied by considerable and somewhat irregular fibrotic changes with a mild degree of eosinophilic infiltration. No evidence of any tuberculous or luetic changes is present. The microscopic picture presented is that of a chronic plastic process resulting from some long standing infection.

Figs. 12-*A* and *B*.—Intraoral radiograms showing areas of chronic osteomyelitis.

Figs. 12-*C* and *D*.—Intraoral radiograms showing areas of chronic osteomyelitis.

If acidosis is marked, sodium bicarbonate in 5-grain doses may be administered every three hours. Calcium lactate in 5-grain doses, three or four times a day, has an apparent value in replacing the calcium.

The use of ultraviolet radiation, both local and general, is of apparent value.

Sedatives and free lancing over the point of fluctuation often give relief. Where suppuration and bone destruction have taken place all the teeth within the affected region will be found loose and painful. Unless free drainage is obtained, rapid destruction of the mandible will ensue. Deep lancing both

Fig. 12-*E*.—Photomicrograph of area of chronic osteomyelitis shown in intraoral radiograms *A*, *B*, *C*, and *D*. (x265)

intra- and extraorally and the removal of the diseased and loose teeth within the affected area are indicated. The ice bag is indicated in the beginning stages. After incision and drainage and abatement of acute symptoms, a hot magnesium sulphate pack is often beneficial. In some cases the extraction of the responsible teeth may cause resolution of the whole process, but the majority of cases will require surgical treatment. This consists of free drainage and careful observation. A surgical incision should be made wherever pus is found, and whenever bone is separating as a sequestrum, it should be removed.

In the extraction of teeth, I believe every piece of root should be removed even though it is necessary to sacrifice an adjoining healthy tooth, which would rarely occur. There are some few cases, especially in the upper third molar region, where the removal of an apex of a third molar is almost impossible without removal of the second molar.

Treatment of chronic osteomyelitis depends upon the type of disease with which we are dealing. A chronic condition following an acute condition is best treated by allowing a complete sequestration of diseased bone. The area should be drained well and the sequestra removed as formed, but there should

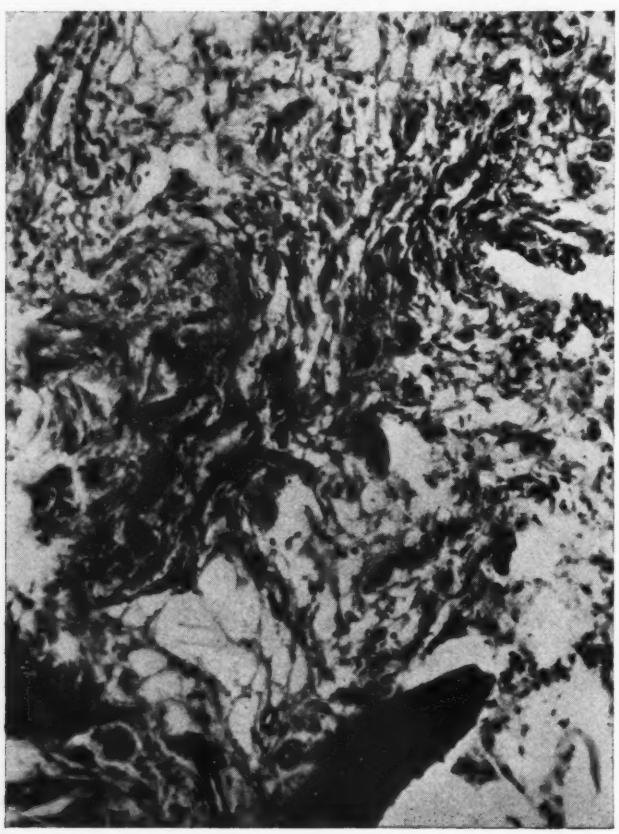


Fig. 12-*F*.—Photomicrograph of area of chronic osteomyelitis shown in intraoral radiograms *A, B, C,* and *D*. (x265)

be no curetting or scraping of bone. In the type of chronic osteomyelitis which occurs without any previous condition of acute osteomyelitis, there are no acute symptoms and no definite exfoliation of sequestra. There may be just osteoporosis resembling a plain osteitis or there may be alternating areas of osteoporosis and new bone formation. These areas require surgical removal and curetting down to normal tissue and if any roots are present, they should be removed.

Thorek calls attention to the aluminum-potassium nitrate compound, and states that when properly used, it possesses remarkable properties in combating chronic infective suppurative processes.

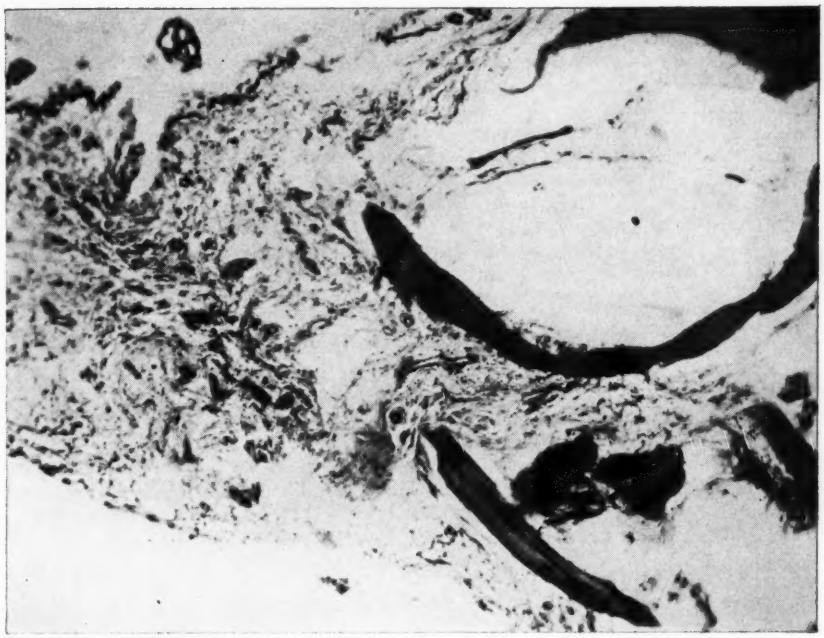


Fig. 12-*H*.—Photomicrograph of area of osteomyelitis shown in intraoral radiograms *A*, *B*, *C*, and *D*. (x170.)

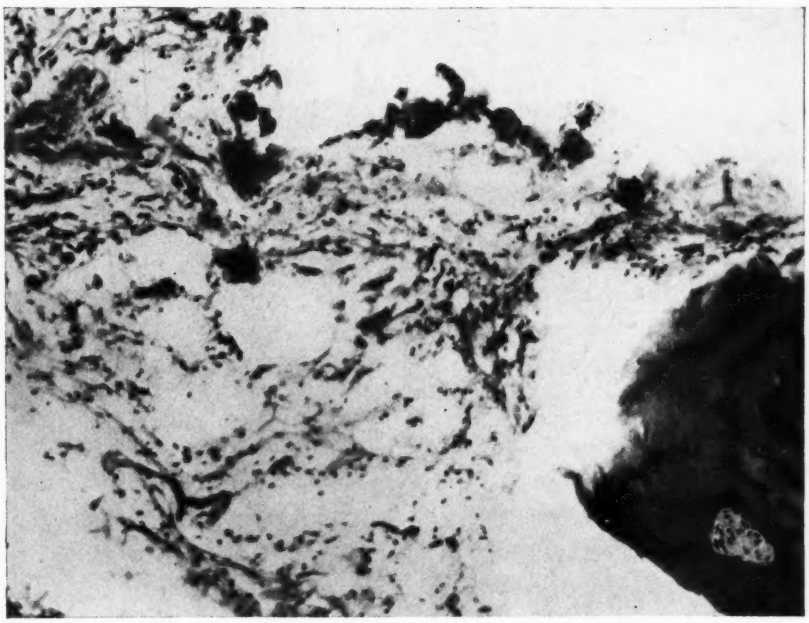


Fig. 12-*G*.—Photomicrograph of area of chronic osteomyelitis shown in intraoral radiograms *A*, *B*, *C*, and *D*. (x265.)

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UNILATERAL ACUTE TONSILLITIS COMPLICATING EXTRACTION OF THE LOWER THIRD MOLAR

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From the Department of Oto-Laryngology, Washington University Medical School

COMPLICATIONS following the extraction of the mandibular third molar tooth, such as swelling of the surrounding soft tissues, submaxillary lymphadenitis, phlegmon of the floor of the mouth, submaxillary abscess, periostitis, osteomyelitis and fracture of the mandible, partial ankylosis of the jaw and reflex earache, are not uncommon.

As far as I have been able to ascertain, from the interrogation of dentists who specialize in exodontia, unilateral tonsillitis complicating the extraction of the mandibular third molar is very unusual. If those patients who complain of sore throat and painful swallowing, following this procedure, were examined by an otolaryngologist, many cases of unilateral tonsillitis would undoubtedly be observed, and the incidence of this complication should be much higher.

Of all the possible complications, partial ankylosis or stiffness of the jaw occurs, in more or less degree, in each case. This occurs as a natural consequence of the inflammation of the tissues adjacent to the alveolus, particularly the masseter muscle. There is every reason to believe that the other complications are dependent upon the degree of infection present in the tooth and gums at the time of extraction. It is well known that complications are particularly prone to occur if the tooth is removed in the presence of acute infection.

The occurrence of unilateral acute tonsillitis as a complication presupposes the presence of a chronic infection of the tonsils. In the event that the inflammation in the tissues adjacent to the alveolus spreads to the tonsillar fossa, an acute inflammatory process may be excited and all the symptoms and signs of acute tonsillitis may appear. It is also probable that the injection of a local anesthetic into the region of the mandibular foramen plays an important part in the cause of this complication.

The patient complains of sore throat, painful swallowing, prostration, and malaise. There may be a marked rise in temperature, and the illness of the patient is much greater than usually expected after the removal of a third molar tooth.

In the following three cases, the patients had definite chronic tonsillitis, as discovered by the examination of the uninvolved tonsil. There were no other complications, and the inflammatory zone adjacent to the alveolus did not appear unusually marked except in Case 3. In all cases a local anesthetic was injected into the region of the mandibular foramen.

CASE 1.—A white male, age twenty-one years, complaining of sore throat, painful swallowing, slight ankylosis of the jaw, swelling of the upper right cervical region and general weakness, gave a history of having had the right mandibular third molar extracted six days previously. The throat symptoms followed within twenty-four hours after the removal of the tooth.

The examination of the jaw showed a small wound which was healing normally. There was no marked swelling of the surrounding tissues, but the swelling extended back to the region of the anterior pillar of the tonsil. The right tonsil was about twice the size of the left, deep red in color, painful to touch, and pus was discharging from the crypts. There was a marked swelling of the upper deep cervical glands. The left tonsil showed evidence of chronic infection.

Antiseptics were applied to the tonsil. The patient was given internal medication, advised to go to bed, and instructed to use hot saline irrigations in the throat. Within a few days, the inflammation of the tonsil subsided and subsequently the tonsils were removed.

CASE 2.—A white male, age thirty-five years, complaining of sore throat, painful swallowing, reflex earache and general exhaustion was seen within twenty-four hours after the extraction of the lower right third molar. The examination of the mouth did not reveal an unusual degree of ankylosis of the jaws and the reaction around the alveolus, although not unusual, extended back to the region of the right tonsil.

The tonsil was very red, markedly swollen, and was very painful to manipulation. Pus was discharging from the crypts. The upper right deep cervical region was moderately infiltrated. The left tonsil was very much smaller than the right and showed definite evidence of chronic infection.

The right tonsil was treated with antiseptic solutions. The patient was put to bed and internal medication was administered. He used hot saline irrigations in the throat, and within a few days the symptoms of acute tonsillitis disappeared. The alveolus healed uneventfully.

CASE 3.—A white male, age twenty-eight years, complaining of sore throat, painful swallowing, swelling of the face and neck, fever and general weakness, gave a history of having had the right lower third molar extracted under local anesthesia five days previously.

Examination revealed a marked infiltration of the right submaxillary and upper deep cervical regions. There was also swelling along the outer border of the alveolus opposite the third molar socket. A small amount of pus was discharging from the wound. There was a rather marked ankylosis of the jaws, the distance between the incisors being only about ½ cm. upon opening the mouth. The right tonsil was large, red, swollen, painful to pressure, and was discharging pus. The left tonsil was of moderate size showing evidence of chronic infection but free from acute inflammation. An x-ray of the right mandibular jaw showed a slight roughening of the bone, suggesting osteomyelitis.

The patient was sent to the hospital for treatment. Swallowing became so difficult that a nasal tube had to be inserted for feeding. Hot packs were

applied to the face and neck, and the mouth was frequently cleansed. The patient was kept in bed and general medication was administered. The temperature was elevated to 102 and 103 for several days. After five days' treatment in the hospital, the swelling of the face and neck subsided. The wound in the jaw ceased to discharge pus and the acute tonsillitis subsided. The patient was dismissed from the hospital and advised to have his tonsils removed.

In conclusion, I want to emphasize the importance of considering the presence of unilateral acute tonsillitis in all cases in which the extraction of a molar tooth is complicated by sore throat, painful swallowing, fever, and general symptoms.

In cases in which both mandibular third molars must be removed and in which unilateral acute tonsillitis follows the first extraction, tonsillectomy should be advised before resorting to removal of the other mandibular third molar tooth.

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DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

Edited By
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and Howard R. Raper, D.D.S., F.A.C.D.

X-RAY EXHIBIT*

By F. M. Casto, D.D.S., Cleveland, Ohio

THE series from Figs. 1 to 31 inclusive, disclose anatomic variations and anomalies.

The series from Figs. 32 to 35 inclusive, illustrate a method for taking full mouth pictures of young patients.

The series from Figs. 36 to 49, illustrate the various stages of development from the age of three and one-half years to eighteen years.

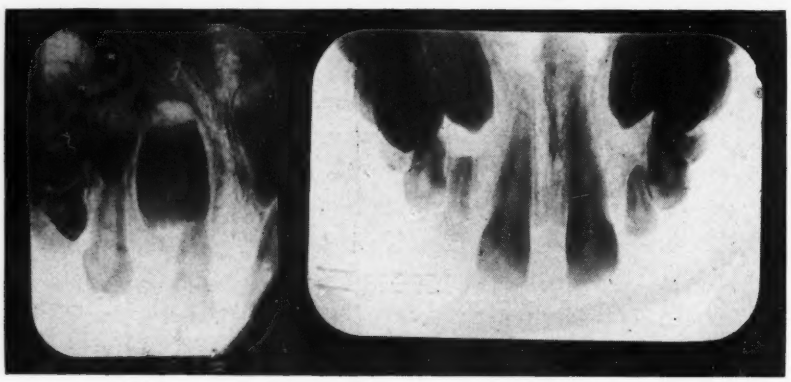

Fig. 1. Fig. 2.

Fig. 1.—Missing teeth. Missing maxillary left lateral incisor. Patient, female five and one-half years old.

Fig. 2.—Missing maxillary lateral incisors. Patient, male eight and one-half years old.

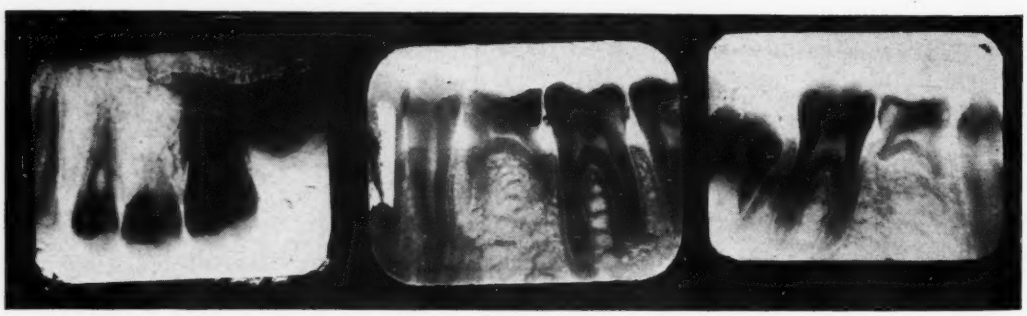

Fig. 3. Fig. 4. Fig. 5.

Figs. 3, 4, 5.—Missing maxillary second left premolar and mandibular second right and left premolars. Patient, female twelve years old. It will be observed that the roots of the deciduous molars are being resorbed.

*Presented before the First International Orthodontic Congress.

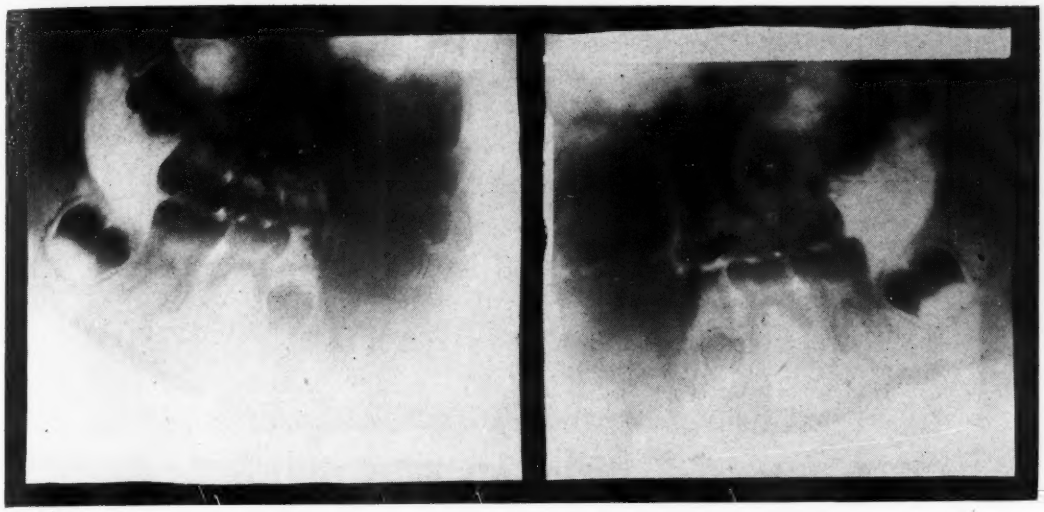

Fig. 6. Fig. 7.

Figs. 6, 7.—Missing mandibular second premolars. The stage of development on both sides is quite alike. Patient, female nine years old.

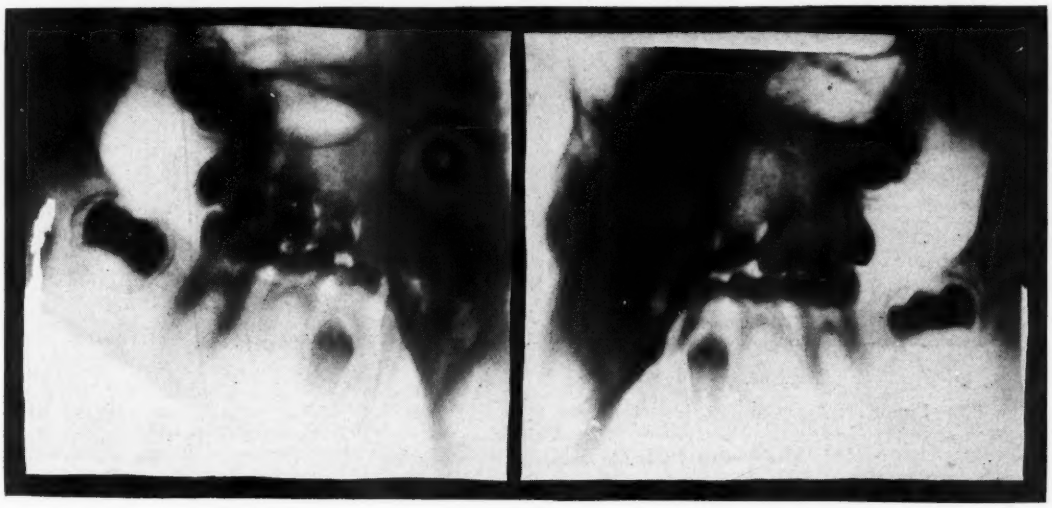

Fig. 8. Fig. 9.

Figs. 8, 9.—Missing four maxillary premolars and both mandibular second premolars. It is to be observed again that the stages of development on both sides are quite uniform. Patient, male eight years old.

Fig. 10. Fig. 11.

Figs. 10, 11.—Missing maxillary laterals, canines and premolars and mandibular incisors (centrals and laterals) canines, and premolars. In this case all the permanent teeth were missing from the jaws, except the maxillary central incisors. It was a case of endocrine disturbance. Patient, male fourteen and one-half years old.

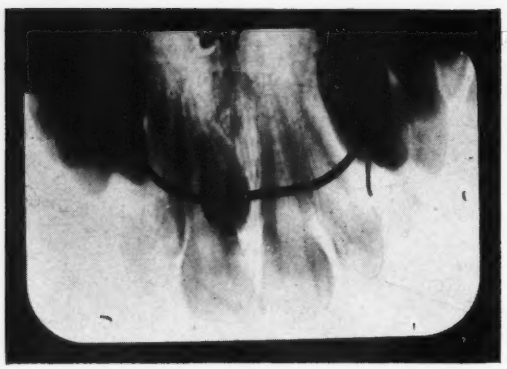

Fig. 12.—Supernumerary teeth. Small unsuspected supernumerary tooth lingual to the maxillary left central incisor. Patient, male eleven years old.

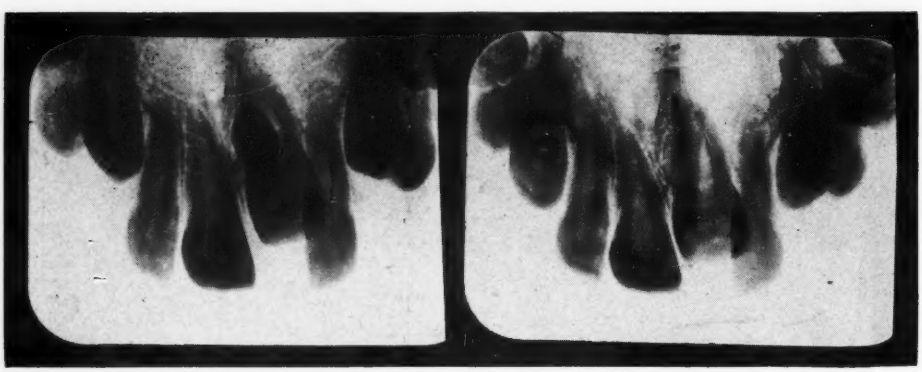

Fig. 13. Fig. 14.

Fig. 13.—Supernumerary tooth inverted and lying just lingual and in close proximity to the maxillary central incisors. Patient, female fourteen years old.

Fig. 14.—After its removal.

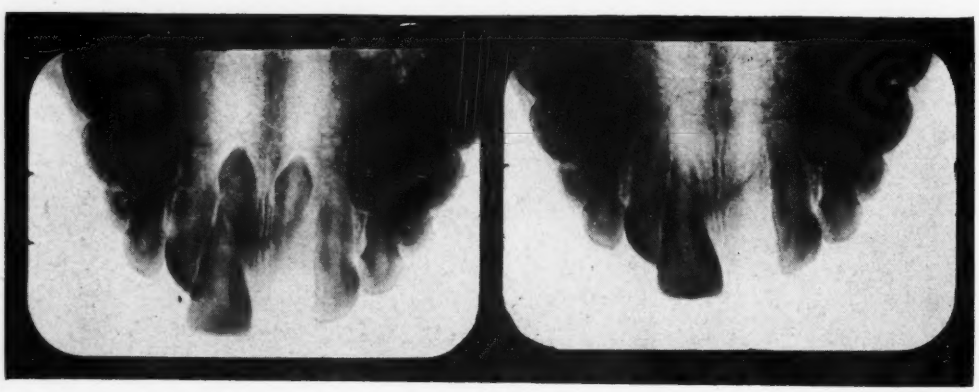

Fig. 15. Fig. 16.

Fig. 15.—Two inverted supernumerary teeth lying lingual to the maxillary central incisors. The right central incisor was lost through an accident. Patient, female nine and one-half years old.

Fig. 16.—After their removal.

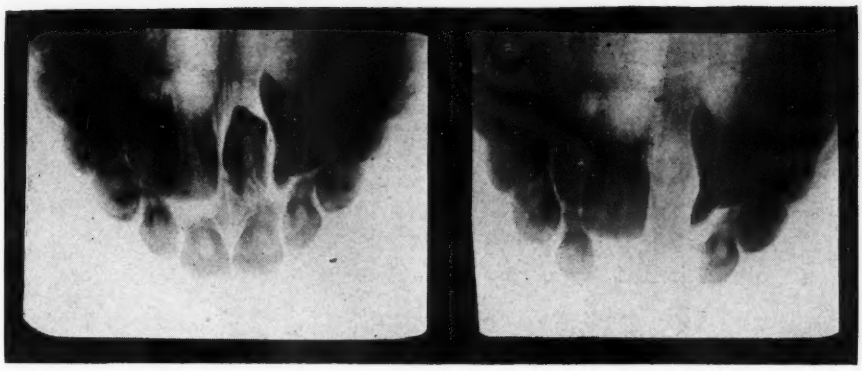

Fig. 17. Fig. 18.

Fig. 17.—Inverted supernumerary tooth lying lingual to the maxillary left deciduous central and between the permanent centrals. Patient, male six years old.

Fig. 18.—After its removal.

Fig. 19. Fig. 20.

Fig. 19.—Inverted supernumerary tooth lying to the lingual of the apex of the maxillary left central incisors. The right central shows a definite horizontal fracture which occurred through an accident ten years previous. The tooth is vital. Patient, male twenty-nine years old.

Fig. 20.—Impacted maxillary right second deciduous molar and right second premolar. Patient, female ten years old.

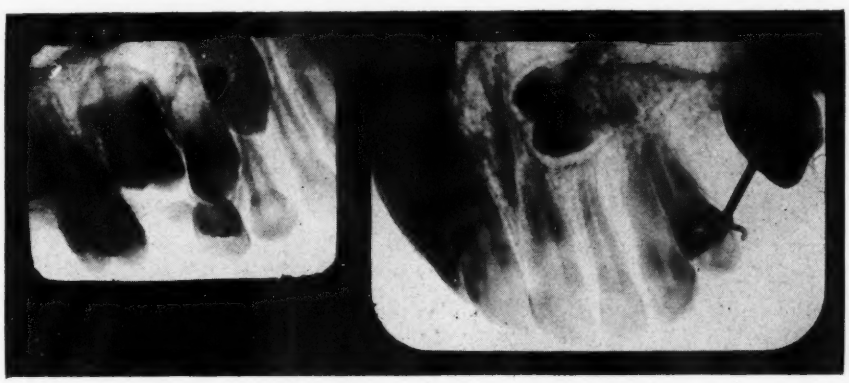

Fig. 21. Fig. 22.

Fig. 21.—Impacted maxillary left second deciduous molar and left second premolar. Also a supernumerary tooth lying horizontal below the impacted teeth and between the first deciduous and permanent molars. Patient, female nine and one-half years old.

Fig. 22.—Impacted maxillary left second premolar lying horizontal at the apices and to the lingual of the central, lateral, canine, and first premolar. Patient, female seventeen years old.

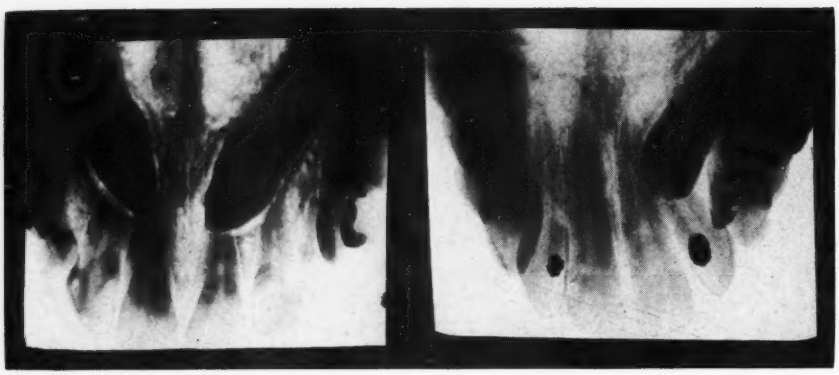

Fig. 23. Fig. 24.

Fig. 23.—Impacted maxillary canines lying to the lingual of the central and lateral incisors. Patient, female sixteen years old.

Fig. 24.—Impacted maxillary right canine lying lingual to and encroaching upon the root of the central and lateral incisors. Patient, female sixteen years old.

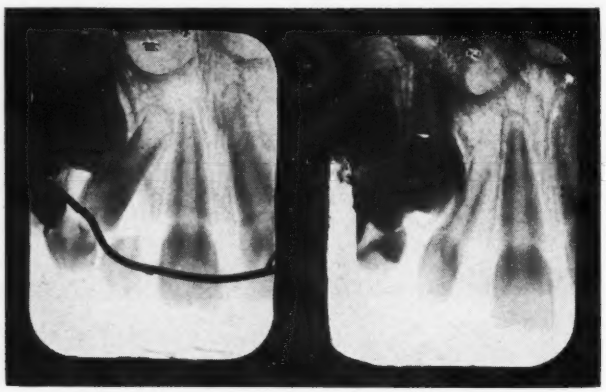

Fig. 25. Fig. 26.

Figs. 25, 26.—Typical and rather common cases of impaction, where the erupting maxillary canines press against the lateral incisors causing them to be dislodged. Patients, males six and eight years old respectively.

Fig. 27.—Cysts. A cyst involving the maxillary left lateral and canine causing pressure against the root of the central and a considerable dissolution of bone. Patient, male seven and one-half years old.

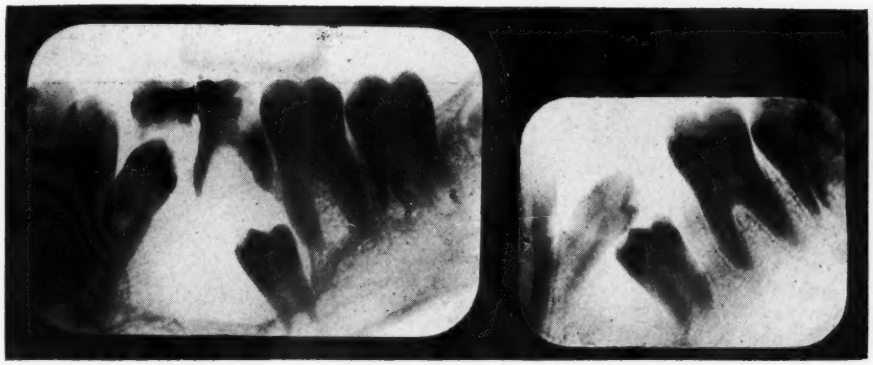

Fig. 28. Fig. 29.

Figs. 28, 29.—A cyst involving the mandibular right first and second premolars and causing a dissolution of tissue and pressure against the mesial root of the first molar. Fig. 29 is three months after the operation. Patient, male eleven years old.

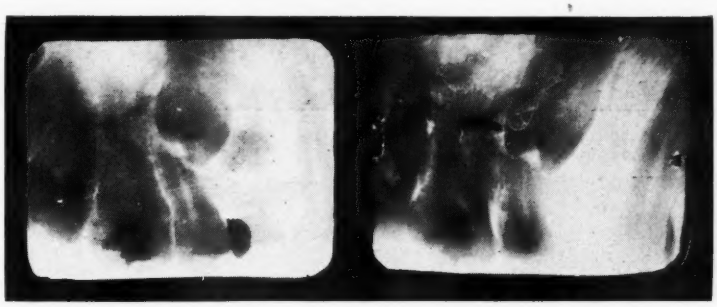

Fig. 30. Fig. 31.

Figs. 30, 31.—A small odontoma encysted, lying above the maxillary left first deciduous molar causing the impaction of the first premolar. Fig. 31 is three weeks after removal. Patient, male eighteen years old.

Fig. 32. Fig. 33.

Figs. 32, 33.—A method of taking full mouth x-ray pictures of young patients. Intraoral radiograms of the maxillary and mandibular incisors.

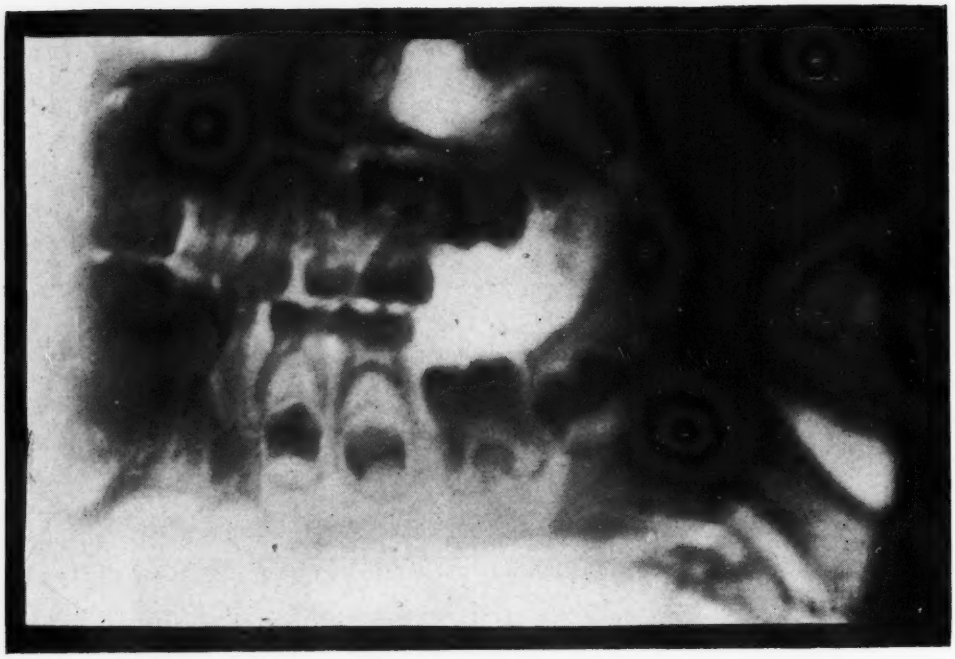

Fig. 34.

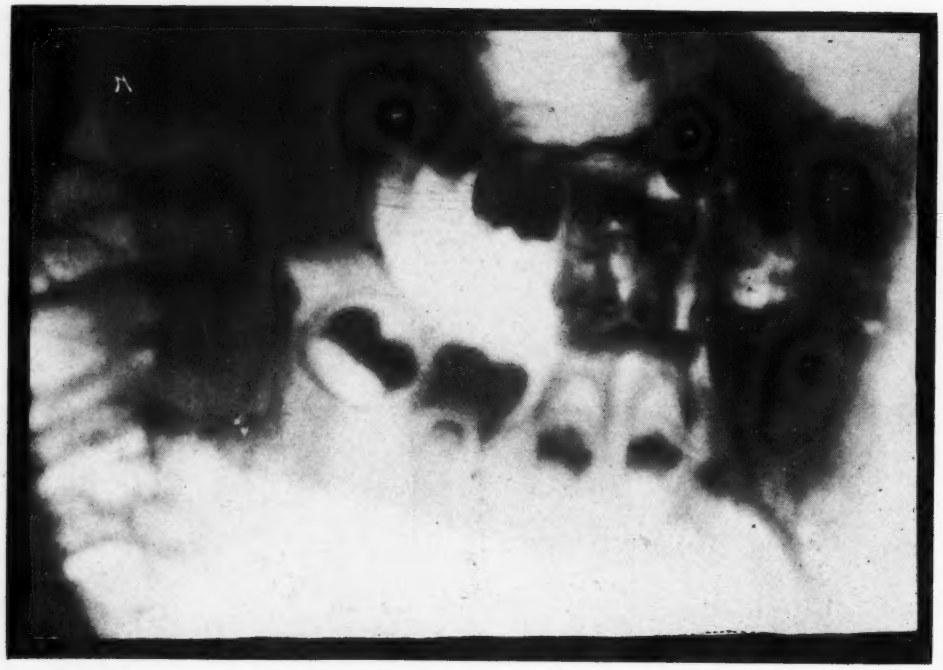

Fig. 35.

Figs. 34, 35.—Extraoral pictures of the posterior or cheek teeth. Patient, female five years old.

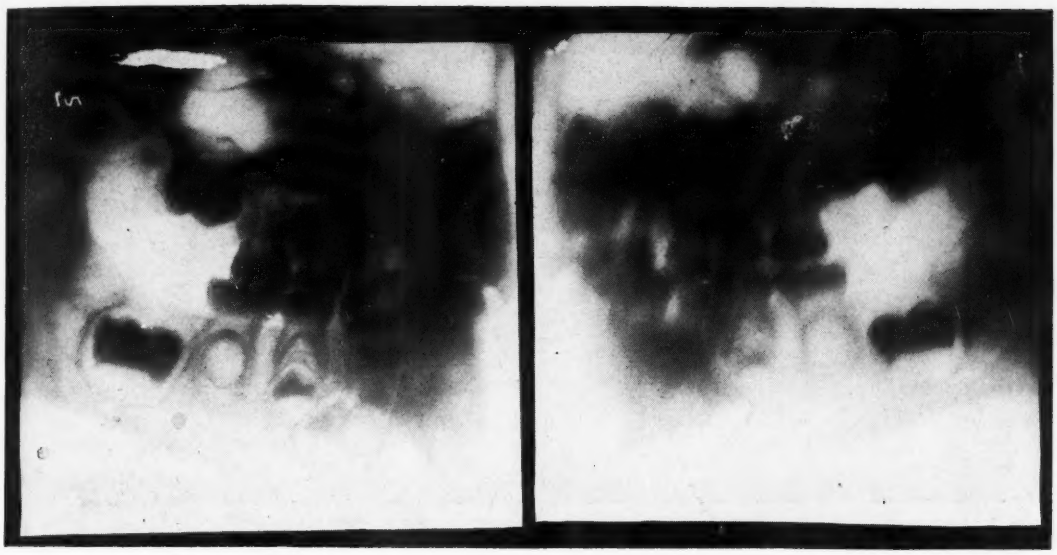

Fig. 36. Fig. 37.

Figs. 36, 37.—Various stages of development. Extraoral right and left sides. Patient three and one-half years old.

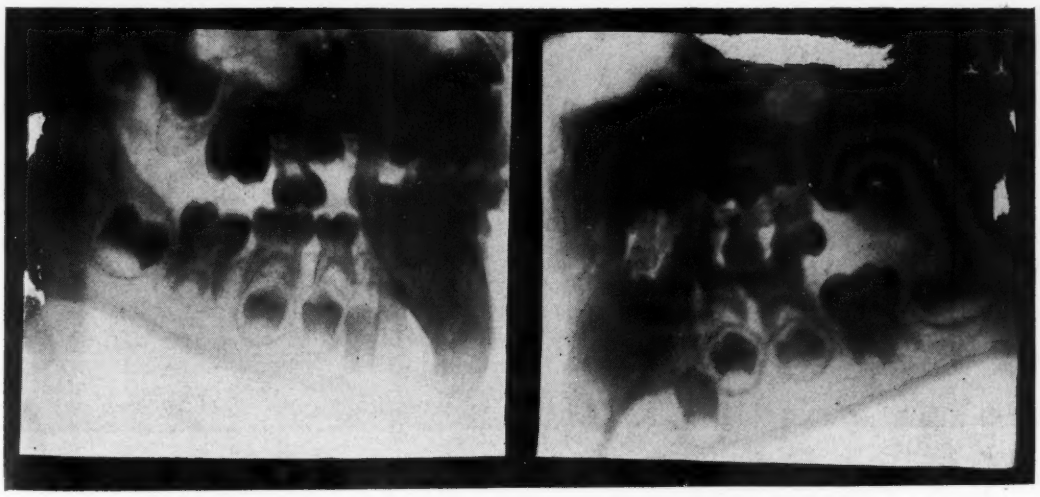

Fig. 38. Fig. 39.

Figs. 38, 39.—Extraoral right and left sides. Patient five years old.

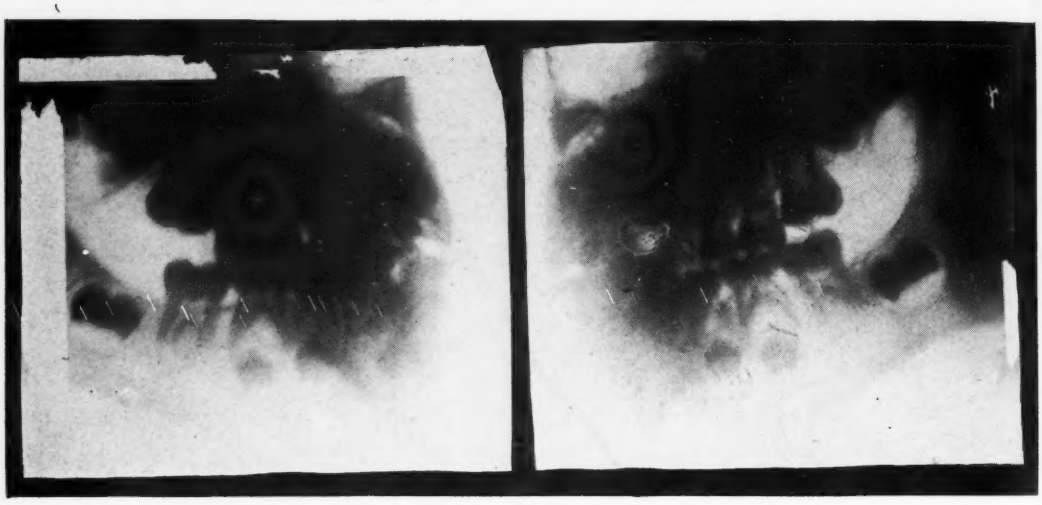

Fig. 40. Fig. 41.

Figs. 40, 41.—Extraoral right and left sides. Patient six and one-half years old.

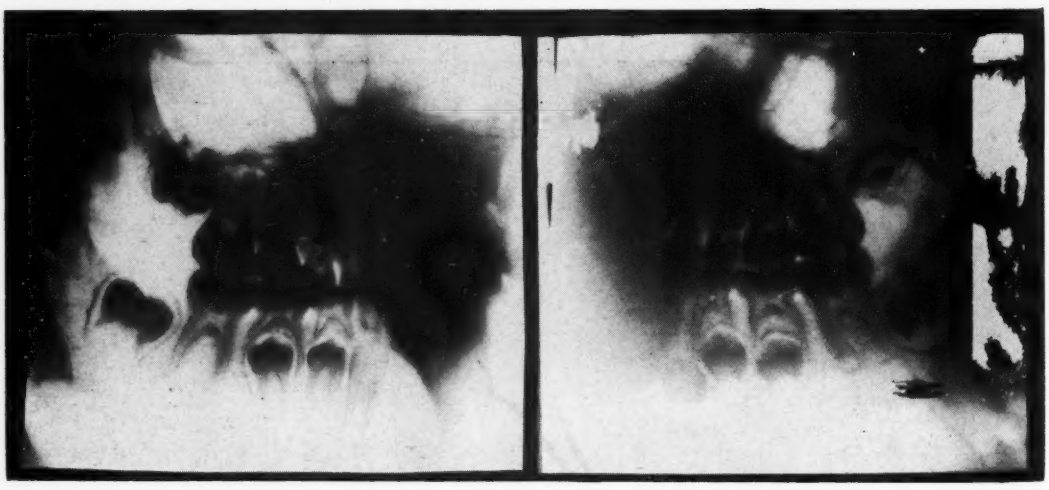

Fig. 42. Fig. 43.

Figs. 42, 43.—Extraoral right and left sides. Patient eight years old.

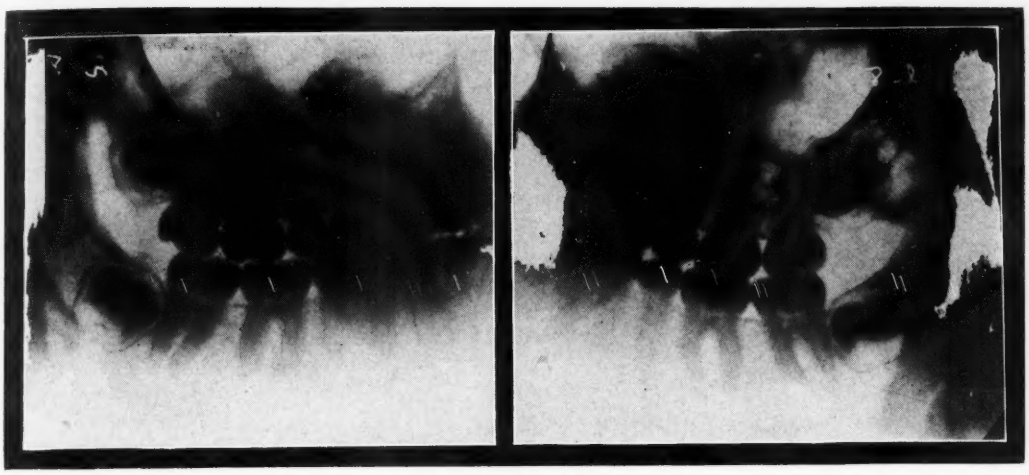

Fig. 44. Fig. 45.

Figs. 44, 45.—Extraoral right and left sides. Patient eleven and one-half years old.

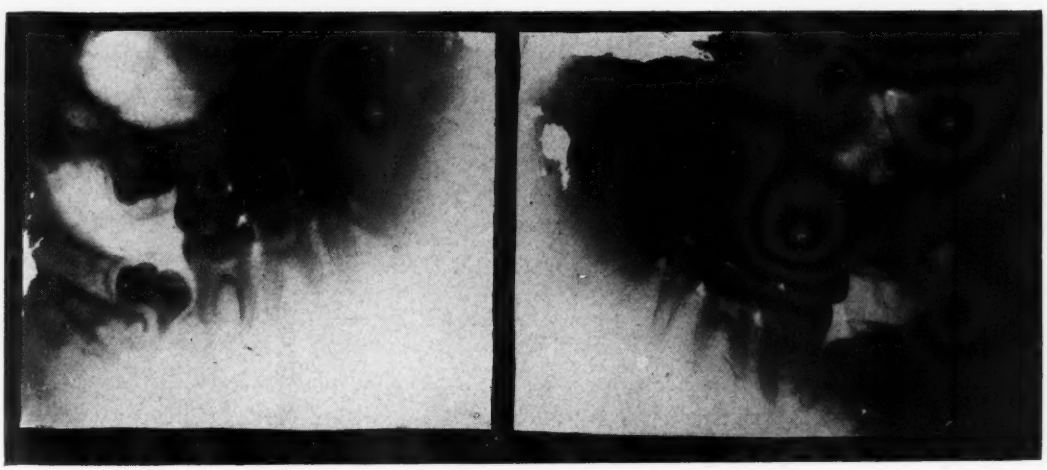

Fig. 46. Fig. 47.

Figs. 46, 47.—Extraoral right and left sides. Patient fifteen years old.

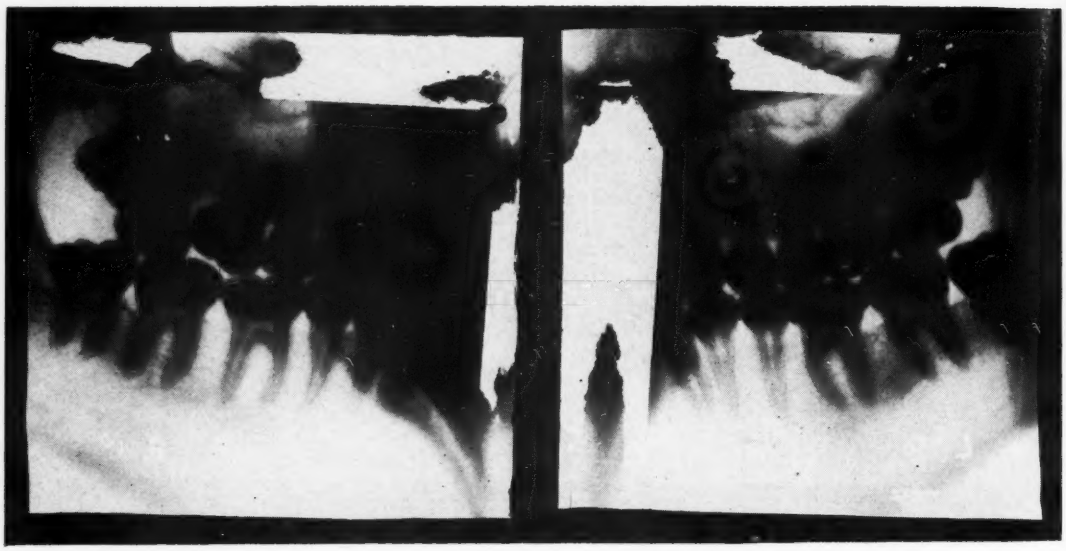

Fig. 48. Fig. 49.

Figs. 48, 49.—Extraoral right and left sides. Patient eighteen years old.

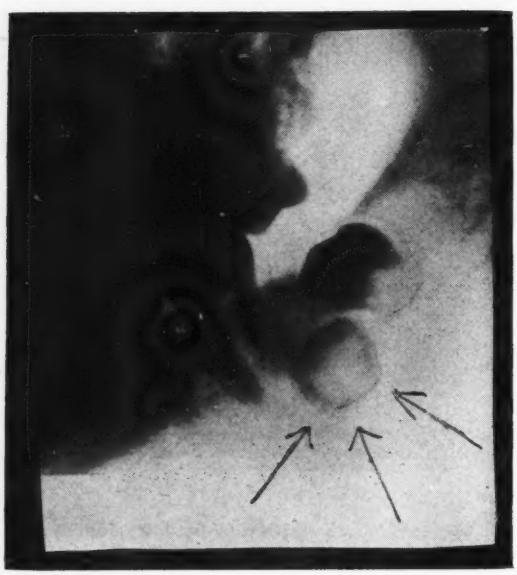

Fig. 50.—Extraoral left side. Patient twenty years old. A diagnosis of this case has not as yet been effected. Obviously it is a slow growing tumor which has affected the development of the third molar. Its removal including the third molar has been advised.

ABSTRACT OF CURRENT LITERATURE

Covering Such Subjects as

ORTHODONTIA — ORAL SURGERY — SURGICAL ORTHODONTIA — DENTAL RADIOGRAPHY

It is the purpose of this JOURNAL to review so far as possible the most important literature as it appears in English and Foreign periodicals and to present it in abstract form. Authors are requested to send abstracts or reprints of their papers to the publishers.

A Case of Scurvy. E. M. Silver (New York). The Dental Cosmos, February, 1928, lxx, 2.

The following rare case of scurvy in the absence of the usual aggravating circumstances is given by an interne of Lincoln Hospital. The patient was a woman of thirty-two whose gums had shown a tendency to bleed as long as she could remember. Her general health had been poor with rheumatoid and neuralgic symptoms and loss of weight, the diagnosis having taken in the possibility of a focal infection from the gums. The joint symptoms became aggravated until the patient went on crutches, treatment consisting chiefly of heat and electricity. A dentist who was called in found the gums tender and swollen, more or less stomatitis, teeth sound but somewhat loose, the gums bleeding readily with submucous extravasations. Questioning brought out that her diet was unbalanced with omission of fruits and vegetables and chief dependence on bread and meat. The presence of ecchymoses in the lower extremities appeared to clinch the suspicion of adult scurvy. Patient was at once placed on the antiscorbutic diet and in two weeks she was able to walk without crutches. She recovered completely on a balanced regimen and oral hygiene.

Flat Foot as a Dentist's Occupational Disease. Muskat (Berlin). Correspondenz-Blatt für Zahnärtze, January, 1928, lii, 1.

The author is an orthopedic surgeon who recently gave a motion picture lecture before the Dental Congress at Nürnberg. Flat foot is now recognized as an all but universal affection and among the dental profession it rates first in frequency and importance as an occupational disease. The great frequency of the latter at the present time may be brought into relationship with the war. About 25 per cent of all Prussian men and a still higher per cent of Austrians were ineligible for the fighting ranks from this cause. Attempts to correct this evil go back to childhood years, and have to do with foot coverings, floor coverings, seating arrangements, etc. Of even more importance, however, is the care of the foot. The symptoms due to flat foot are not characteristic but are readily confused with those of neuralgia, rheumatism, neurasthenia, etc. If the anterior part of the foot is spread the transverse arch is lost and severe pains with callus formation is the result.

The toes must retain their mobility, the outer margin of the shoe must be weighted and the feet must point straight ahead. Plasters are of great value in restoring the natural shape of the foot. Supporters of duralumin suited to the shape of the foot are of great value. Corns, ingrowing nails, etc., must be treated, for all tender points cause the foot to assume a false position. The author does not believe with some orthopedists that a flat foot may be a normal variation. He appends a list of directions for antagonizing flat foot which he is distributing as a leaflet. Of great importance is daily care of the feet comprising cleanliness, cutting the nails properly (straight across), flexion and extension of the bare toes and of the foot on the ankle, etc. Stockings as well as shoes should be rights and lefts.

Fungous Gingivitis. U. Saraval (Venice). La Revue de Stomatologie, November, 1927, xxix, 11.

This affection is rather rare, a form of hypertrophic gingivitis, occurring only in some area of the dental arcades and characterized by voluminous vegetations which bleed readily. As a rule there is no pain nor any swelling of the regional lymphnodes. The lesions may be confused with the proud flesh which forms near the roots of carious teeth or in connection with bone fistulae; with the fungous granulations of syphilis and tubercle and in general with neoplasms. Recently within a single month the author had occasion to operate on one of these cases and also on a patient with epulis. The resemblance between these lesions was striking, so much so that one must think of a common origin. The patient with fungous gingivitis was a man of sixty-two, who presented large vegetations in the left alveolar region of both upper and lower jaws. The condition dated back three to four months and the patient was brought to the clinic because of a severe attack of hemorrhage. The lesions after removal were submitted to the microscope which showed a pure granulation tissue of a fibroplastic character. The patient with epulis was a woman of twenty-five, and the lesion was limited to the region of the superior incisors. The microscopic appearance was of a fibrillary tissue with a lymphoplastic infiltration and there were areas of beginning calcification. The duration of the lesion was about eight months. The chief differences were as follows: in the fungoid condition the granulation tissue was young while in the epulis it was much older besides showing the formation of osteoid tissue. The author sees no reason why fungous gingivitis should not develop into epulis which has long been thought to be of inflammatory origin.

Pyorrhea in a Nutshell. H. Prinz (Philadelphia). The Dental Digest, January, 1928, xxxiv, 1.

The author sums up this subject in one and a half pages of the *Digest*. Marginal pyorrhea yields readily to treatment while the vertical form is difficult enough and when advanced means extraction. The marginal form spreads from tooth to tooth as a chronic inflammatory process and is due largely to a neglected mouth; destruction of the alveolar circular ligament is followed by recession of the gums. Vertical, also known as true, pyorrhea

is limited to isolated teeth, the pockets being characteristic. There are no primary inflammatory symptoms—pain, swelling, etc. Single rooted teeth are the first to show deviated position. The calculus in the pocket is an effect and not a cause, the pocket becomes filled with granulation tissue and a secondary infection may result. Abscesses and fistulas which may form are not due to infected pulp. The worse the pyorrhea the less the tendency to caries. Teeth should be tested by percussion and for motility. Mandibular lymphnodes may be enlarged. Since there may be a dearth of symptoms the first things to be noted are migration and motility of the incisor teeth, recession of the gums, pockets and calculus. The author is referring chiefly to middle-aged men and in general to the age period from twenty to fifty, not to elderly subjects, for pyorrhea is a disease of middle life, exceptionally developing prematurely. Not very much help is afforded by an x-ray examination but the history of cases is important, with especial reference to diseases of metabolism, and in routine practice it is well to make blood, urine and saliva tests.

Bacteria in Vital Pulps. A. J. McDonagh (Toronto). The Journal of Dental Research, December, 1927, vii, 4.

Starting with the subject of bacteria in septic teeth, the author has gone backwards to the possibility of the occurrence of microorganisms in live pulps. All extracted teeth were studied without at first any attempt to distinguish between living and lifeless pulps. The results were often problematic, for in some teeth with pulp entirely broken down no organisms could be detected. A special study was eventually carried out on a series of 200 freshly extracted and known to be vital. The author always employed a culture technic and in this series every pulp tested and even fractional parts of pulps yielded organisms. It seemed possible that the technic might be at fault to give such results, so that all of the steps were carefully checked up and the opinion of other and expert men was invoked. It was finally judged that the organisms made their way into the pulp chambers not only through the cavity opening but also probably through intact dentine. The latter accident occurred quite readily in teeth which had first been ground down so that the enamel had disappeared. There was no reason for supposing that the germs are able to penetrate intact enamel or cementum but the most recent studies of the author show that even these substances are not absolutely sterile and in fact that a majority of perfect teeth, living, of course, contain organisms. These finds may revolutionize the subject of focal infection for the Streptococcus viridans seems to have been the germ most constantly present, with the Staphylococcus aureus second—both pathogens of focal infection. The next step, of course, is to test these teeth for periapical mischief, to make blood culture tests, etc., in order to connect living teeth more intimately with focal infection.

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EDITORIALS

Untoward Results from Extraction of Infected Teeth

THE dentist engaged in the extraction of infected teeth realizes that certain dangers or complications are apt to occur from this procedure. No one will deny the importance of removing infected teeth, and we have all observed most gratifying results in certain cases; but, does the dentist always exercise his utmost skill in the application of his technic and the selection of his patients?

A review of the reports in the literature on the untoward results from the extraction of teeth elicits the fact that often poor technic is not only employed, but too many teeth are removed at one sitting and sufficient care is not exercised in the selection of patients.

In the recent medical literature two most comprehensive articles have appeared which are indeed worthy of note. A paper on "Necropsy Reports

on Persons Dying Shortly after the Extraction of Teeth" by R. C. Buckley, in the *Journal of the American Medical Association,* emphasizes the dangers associated with the extraction of teeth. Buckley reports three cases, giving the detailed clinical history and necropsy reports. The first case was that of a man aged forty-four years who had had diabetes for three years. Two molar teeth were extracted under gas anesthesia and four days later the remaining teeth were removed. Considerable hemorrhage followed the extractions. During the next five days the patient became seriously ill and later became comatose. Death occurred two weeks after the first dental operation. Necropsy showed hypoplasia and hyalinization of the insular tissue of the pancreas, a diffuse acute inflammatory reaction involving the pancreas and stomach and recent necrosis of the myocardium, liver, and renal epithelium.

From the clinical standpoint the case was regarded as one of aggravation of the diabetic condition by the extraction of many teeth, followed by infection of the lacerated gums.

The second patient was a man aged fifty-six years who had his upper teeth removed about two months previously because of pyorrhea alveolaris. During the next five weeks he complained of severe pains all over the body but particularly in the left side and middle of the back. Three weeks previously he had the last of his teeth removed. Several days later, vomiting began and occurred every evening for a week. Later he developed dizziness. Dyspnea and palpitation were present on slight exertion. After a thorough study a diagnosis of chronic nephritis with uremia was made. The patient finally died thirteen weeks after the first extraction of teeth.

The most important findings at necropsy were: multiple focal necroses of the myocardium; central necrosis of the liver; chronic diffuse nephritis; ascites and cardiac hypertrophy.

The third case was that of a man aged forty-three years who had toothache and swelling of the right side of the face three weeks previously. One week later the first and second upper right molars were removed. Before extraction, the dental surgeon noted a chronic alveolar abscess of the latter tooth with a fistula discharging pus freely. After removal of the tooth the area was curetted. During the next two weeks the local condition became worse. The swelling of the right cheek increased and became more painful. The tissues of the right upper jaw became necrotic and coated with pus. The next day the patient had chills and high fever. The antrum became infected and was treated. The patient finally developed meningitis and possibly cavernous sinus thrombosis and died five weeks after the extraction of the teeth.

Necropsy showed osteomyelitis of right maxilla; acute maxillary sinusitis; extension of infection along the right maxillary nerve to right semilunar ganglion, extradural space and tissues about the hypophysis and left orbit; fibrinopurulent meningitis; abscess of right temporal lobe of brain with rupture into ventricle and multiple abscesses of viscera. Bacteriologic examination showed Staphylococcus aureus.

The first two cases illustrate the serious complications of extraction of teeth in patients whose general condition is poor as a result of an existing

chronic disease. The third case illustrates the danger of removing teeth in the presence of severe acute infection.

In the October, 1927, issue of the *Ohio State Medical Journal,* Richard Dexter reported four cases, emphasizing the dangers of the indiscriminate removal of infected teeth.

The first patient was a man, age thirty-three years, who six days before had a right and left lower molar removed. The next day the face became swollen and painful. A cellulitis developed which involved the face, neck, and mouth. The patient was severely ill with an overwhelming infection. The floor of the mouth became gangrenous and was drained but the patient died on the following day. In this case the patient, previously in the best of health, died with an overwhelming gangrenous infection of the mouth and face following directly on the removal of two abscessed teeth.

In the second case, a man, age sixty-three years, had a number of infected teeth removed at one sitting. This was followed immediately by symptoms of a general blood infection, which resulted in death six days after the extraction.

In the third case a female, age twenty-one years, developed a fatal local and general infection following the removal of one presumably infected tooth. In this case it was particularly noteworthy that the extraction, which required two operations, was accompanied by definite trauma.

In the fourth case, a man, age fifty-nine years, two pathologic processes existed, the one a subacute endocarditis with infarction of the brain, lungs, and kidneys and thrombosis of the femoral vein, the other a malignant disease of the stomach. The symptoms of infection made their appearance only after the extraction of four badly infected teeth.

Dexter refers to reports of eight other cases in the literature in which death occurred from the extraction of teeth. It is noteworthy that in about 75 per cent of the cases the patients were more than fifty years of age, which suggests that more careful attention should be given to these cases.

While the age of the patient may be a somewhat significant factor in the severity of the resulting infection, it seems that the number of teeth removed has little to do with it.

The most important factors, therefore, must be, in the first place, the surgical technic employed and, in the second place, the condition of the patient. By the employment of careful technic with a minimum of trauma, whereby not more than one or two teeth are removed at a sitting and by careful consideration of the condition of the patient as to whether he is able to withstand the operation, the number of serious or fatal cases may be maintained at a minimum.

The close cooperation of the physician and the dentist will avoid untoward results in certain cases.

REFERENCES

Buckley, R. C.: Necropsy Reports on Persons Dying Shortly After the Extraction of Teeth, Jour. Am. Med. Assn., Nov. 19, 1927, lxxxix, 1776.

Dexter, R.: The Dangers of the Indiscriminate Removal of Infected Teeth, Ohio State Med. Jour., October, 1927, xxiii, 811.

—*F. K. H.*

ORTHODONTIC NEWS AND NOTES

Twenty-Seventh Annual Meeting of the American Society of Orthodontists

MONDAY, TUESDAY, WEDNESDAY, AND THURSDAY, APRIL 30, MAY 1, 2, 3, 1928

HOTEL STATLER, BUFFALO, N. Y.

TENTATIVE PROGRAM

The tentative program, as reported by the Board of Censors up to the time of going to press, follows herewith. The Board of Censors reports that it is impossible to outline the definite program of the meeting at this time, and that only such case reports, clinics, essayists, and discussors of papers are listed below as have been reported up to this time.

MONDAY, APRIL 30, 1928

Morning Session

8:30 A.M. Registration.

9:15 A.M. Address of Welcome. By Chancellor Capen, of the University of Buffalo, Buffalo, New York.

9:40 A.M. Response to Address of Welcome. By Herbert Pullen, Buffalo, New York.

10:00 A.M. General Business Meeting.
Report of Board of Censors. By H. C. Pollock, Chairman.
Report of the Secretary-Treasurer, C. R. Baker.

10:30 A.M. President's Address. By Walter H. Ellis, Buffalo, N. Y.

11:00 A.M. Case Report. By J. D. Eby, New York City.

11:30 A.M. Case Report. By Harry E. Kelsey, Baltimore, Md.

12:15 P.M. Adjournment.

Afternoon Session

2:00 P.M. Case Report. By Dr. Suggett-Scott, San Francisco, Calif.

2:15 P.M. Essay:
The Operative Lengthening of the Bones of the Lower Extremity. By LeRoy C. Abbott, Chief Surgeon, Shriners' Hospital for Crippled Children, St. Louis, Missouri.

Synopsis: The article will deal with the development of a method for the operative lengthening of the bones of the lower extremity. (1) Special emphasis will be given to the method of sectioning the bones at operation and the application of the stretching apparatus. (2) The postoperative treatment which consists of gradual lengthening of the bones by continuous traction. (3) The process of union of the fragments and the practical results secured.

3:15 P.M. Case Report. By William C. Fisher, New York City.

3:45 P.M. Essay (30 minutes):
The Cast Overlay Technic and Its Application in Practice. By R. C. Willett, Peoria, Illinois.
Discussors: Abram Hoffman, Buffalo, N. Y.; Joseph D. Eby, New York City.

4:35 P.M. Case Report. By Frank A. Delabarre, Boston, Mass.

5:15 A.M. Adjournment.

TUESDAY, MAY 1, 1928

Morning Session

9:00 A.M. Business Meeting. Reading of Minutes.

9:15 A.M. Essay:

The Physiological Progress of the Bone Centers of the Hands of Normal Children between the Ages of Five and Sixteen; Also a Comparative Study of Both Retarded and Accelerated Bone Growth in Children Whose General Skeletal Growth Is Similarly Affected. By Clinton C. Howard, Orthodontist to the Good Samaritan (Endocrine) Clinic and the Scottish Rite Hospital for Crippled Children, Atlanta, Ga.

Synopsis: A study has been made of twelve hundred supposedly normal children in the public schools of Atlanta. Fifty pictures for each chronological age were made of each sex. Each child had been previously examined by the Board of Health and pronounced normal in growth and development. The comparative study is based on hand pictures of children with a complete physical survey done at the Good Samaritan (Endocrine) Clinic. The total study amounts to more than two thousand x-ray hand pictures of both normal and abnormal children.

Discussors: W. W. Woodbury, Halifax, Nova Scotia; Dr. Donovan.

10:30 A.M. Business Meeting.

Report of Scientific Research Committee.

Report of Inter-Relations Committee.

Nomination of Officers.

11:30 A.M. Case Report. By Burt Abell, Toledo, Ohio.

12:00 NOON Round Table Luncheon and Discussion. Chairman, Leuman Waugh, New York, New York.

Table No. 1

Topic.—In what way may mouth cleanliness most effectively be maintained during orthodontic treatment?

Topic Leader, Percy R. Ashplant, Newburgh, New York.

Table No. 2

Topic.—(a) How frequently should apparently well cemented anchor bands be recemented? (b) How frequently the other bands?

Topic Leader, James C. Allan, New York, N. Y.

Table No. 3

Topic.—In what way should the orthodontist cooperate with the general practitioner in keeping a "check-up" on new cavities and abnormal gingival conditions?

Topic Leader, Carlton B. Mott, Asheville, N. C.

Table No. 4

Topic.—(a) How do you stimulate cooperation in the indifferent patient? (b) Failing to get cooperation, what is your procedure?

Topic Leader, F. M. Casto, Cleveland, Ohio.

Table No. 5

Topic.—How do you meet the problem of the undernourished patient?

Topic Leader, F. A. Delabarre, Boston, Mass.

Table No. 6

Topic.—When the permanent first molar is lost, do you as a principle (a) maintain the space for an artificial substitute; (b) close the space; (c) why?

Topic Leader, Max E. Ernst, St. Paul, Minn.

Table No. 7

Topic.—Under what conditions do you (a) close the space of one or more missing laterals; (b) open the space of one or more missing laterals?
Topic Leader, W. A. Murray, Evanston, Ill.

Table No. 8

Topic.—(a) To what extent do you attempt to correct excessive overbite? (b) Describe your means of treatment. (c) What retention is used?
Topic Leader, Harry C. Metz, Pittsburgh, Pa.

Table No. 9

Topic.—Have you ever found it impossible to cause an unerupted tooth to erupt by mechanical means? (a) Deciduous. (b) Permanent. If so, to what do you attribute the cause.
Topic Leader, Albert W. Crosby, New Haven, Conn.

Table No. 10

Topic.—(a) What is the earliest age at which the mandibular third molar has shown radiographically? (b) The latest age?
Topic Leader, Paul G. Spencer, Waco, Texas.

Table No. 11

Topic.—What financial arrangement do you prefer: (a) A predetermined fee for completed treatment? (If so, when are payments required?) (b) An initial payment for preliminary work and the making and placing of appliances, and a yearly fee determined by the amount of treatment? (c) If method (b) is used, do you name a maximum which shall not be exceeded for the completed treatment?
Topic Leader, Claude R. Wood, Knoxville, Tenn.

Table No. 12

Topic.—Do you make an extra charge (a) for occasional unforseen visits out of the office as in cases of illness, etc.? (b) For renewal of lost or broken appliances that cannot be repaired? (c) When patients need service as on vacations, etc., from another practitioner, do you require them to pay the practitioner direct, or do you have the statement sent to you? (d) For any other service such as radiograms, photographs, or does your fee include all?
Topic Leader, Harle L. Parks, Atlanta, Ga.

Table No. 13

Topic.—Concerning oral prophylaxis during orthodontic treatment.
Topic Leader, Frederick T. Murless, Hartford, Conn.

Table No. 14

Topic.—What plan do you consider best for recording: (a) Diagnosis. (b) Outline of sequential steps in treatment. (c) Keeping of record of progress during treatment.
Topic Leader, H. Clay Ferris, New York City.

Table No. 15

Topic.—Suggestions for future programs of the society.
Topic Leader, George W. Grieve, Toronto, Canada.

Table No. 16

Topic.—Orthodontic Education.
Topic Leader, Leuman M. Waugh, New York City.

Afternoon Session

3:00 P.M. Case Report. By Herbert Pullen, Buffalo, N. Y.

3:30 P.M. Essay:
Living Orthodontic Appliances. By Alfred P. Rogers, Boston, Mass.
Discussors: Lloyd S. Lourie, Fred Blumenthal, Ralph Gove.

4:00 P.M. Essay:
The Field of the Endowed Dental Infirmary in Orthodontic Education. By H. J. Burkhart, Boston and New York City.

Evening. Banquet and entertainment.
Dr. Leuman Waugh, by way of entertainment, will talk and show moving pictures of his recent cruise to Labrador. He will show some original researches relative to dentition in the lives of the far northern Eskimo.

WEDNESDAY, MAY 2, 1928

Morning Session

9:00 A.M. Business meeting.

9:15 A.M. Essay:
The Entire Technic of the Lingual Arch Showing Step by Step the Construction of the Bands as Well as the Lingual and Labial Arches. The Construction of the Various Types of Auxiliary Springs and the Purpose for Which They Are Intended. (Illustrated by lantern slides.) By Oren A. Oliver, Nashville, Tenn.
Discussor: Joseph D. Eby, New York City.

10:30 A.M. Essay:
The Metallurgy Pertaining to Orthodontic Appliances. By R. V. Williams, Buffalo, New York.

11:00 A.M. Case Report. By George W. Grieve, Toronto, Canada.

11:30 A.M. Essay:
Orthodontic Bibliography. By Abram Hoffman, Buffalo, New York.

12:15 P.M. Past President's Luncheon and Conference.

Afternoon Session

2:00 P.M. Clinics. One-half to be given in the afternoon and one-half in the evening.

4:30 P.M. Business Session and Installation of Officers.

Evening. Recreation.

THURSDAY, MAY 3, 1928

9:00 A.M. Niagara Falls Trip. Motor down River Gorge Route Trip.

12:30 P.M. Luncheon at Country Club.

Afternoon. Golf and sight-seeing.

CASE REPORTS

American Society of Orthodontists

No. 1. A Report of a Progressive Treatment of a Class II, Division II Case, With Particular Attention Being Given to Changes Occurring in the Temporomandibular Articulation and the Angle of the Mandible. By Bert Abell, Toledo, Ohio.

No. 2. Progressive Report of the Correction of an Extreme Case of Distoclusion, Utilizing Occipital Anchorage, the Pin Appliance and Buccal Planes. By George W. Grieve, Toronto, Canada.

No. 3. Case of Cleft Palate With Hare-Lip Showing Necessity of Continuing Treatment Throughout Eruptive Period of the Teeth to Secure Maximum Development. By Harry E. Kelsey, Baltimore, Md.

No. 4. Recovery of Second Mandibular Molar After Collapse in Space Made by Early Extraction of First Molar Bringing Second Molar into Position Occupied by First Molar and Making Room for Impacted Third Molar. By William C. Fisher, New York City.

No. 5. A Further Report of Progress on a Young Case of Excessive Overbite. By Frank A. Delabarre, Boston, Mass.

No. 6. (1) A Case of Unilateral Dislocation of the Mandible, With Gnathostatic Models and Photostatic Picture and Diagnosis.

(2) A Case of Total Protraction and an Incisal Mandibular Attraction With Mesial Occlusion, With Gnathostatic Models and Photostatic Picture and Diagnosis. Models Before and After Treatment. By Allen H. Suggett, San Francisco, Calif.

Competitive Clinics

Southwestern Society of Orthodontists

Chairman, P. G. Spencer, Waco, Texas

No. 1. Posterior Movement of Molars and Premolars to Gain Space for Canines. By Guy Gillespie, Abilene, Texas.

No. 2. Lingual Arch With Coil Spring and Labial Extensions. By Geo. L. Turner, Wichita, Kansas.

No. 3. Adjusting the Carbureter. By T. M. Robertson, Coffeyville, Kansas.

No. 4. Labial Alignment Arch for Correction of Distoclusion With Linguoversion of Superior Central Incisors. By Wm. T. Chapman, El Paso, Texas.

No. 5. Coil Springs. By E. B. Arnold, Houston, Texas.

No. 6. Variations of Loop Locks for Labial Appliances. By P. G. Spencer, Waco, Texas.

No. 7. A Case Report of an Impacted Cuspid. By W. A. McCarter, Topeka, Kansas.

No. 8. Radiographic Case Report. By L. S. Winston, Houston, Texas.

Great Lakes Society

Chairman, Ernest N. Bach, Toledo, Ohio

No. 1. Semiremovable Appliance in Conjunction With Coil Springs. By Albert P. Horton, Toledo, Ohio.

No. 2. Correction of Impacted Maxillary Central Caused by Supernumeraries. By Wm. Revell, Windsor, Ontario.

No. 3. Diagnosis and Time for Treatment of Orthodontic Cases. By Geo. R. Moore, Ann Arbor, Michigan.

No. 4. Application of Light Spring Forces in Orthodontic Treatment. By James D. Locke, Grand Rapids, Mich.

No. 5. Bands. By O. Carl Osborn, Kalamazoo, Mich.

No. 6. Treatment of Overbite in Malocclusion Using Metal Bite Plane. By Harry L. Hosmer, Detroit, Mich.

No. 7. A Quick Setting Artificial Stone for Making Models Using Ordinary Plaster of Paris. By Samuel J. Lewis, Detroit, Mich.

No. 8. A Facial Cast With Inserts. By Earl H. Teetzel, Detroit, Mich.

Southern Society of Orthodontists

Chairman, Claude R. Wood, Knoxville, Tenn.

No. 1. A Simple Technic of Determining the Mesial or Distal Drift of the Molars. By J. E. Johnson, Louisville, Ky.

No. 2. A Useful Overbite Appliance. By Harvey G. Bean, Toronto, Canada.

No. 3. A Further Report on Treatment of Distocclusion and Overbite With Modified Functional Force. By N. C. Leonard, Baltimore, Md.

No. 4. The Use of the Intermaxillary Spring Pressure to Depress Molars and Premolars in Open-bite Cases. By C. C. Howard, Atlanta, Ga.

No. 5. Mandibular Cyst as a Factor in Establishing a Malocclusion. By G. M. Anderson, Baltimore, Md.

No. 6. Congenital Missing Lateral Incisors. By A. S. Baumgardner, Charlotte, N. C.

No. 7. An Appliance for the Retraction of Upper Canines. By H. C. Shotwell, Lynchburg, Va.

Pacific Coast Society of Orthodontists

Chairman, Harvey A. Stryker, Santa Ana, Calif.

No. 1. Some Methods of Reinforcing Half-Round Tubes. By George A. Barker, Seattle, Wash.

New York Society of Orthodontists

Chairman, Lowrie J. Porter, New York City

No. 1. The Newer Types and Designs of Appliances. By Harry E. Abelson, New York City.

No. 2. Treatment by the Use of the Lingual Appliance on Deciduous and Mixed Dentures. By E. Santley Butler, New York City.

No. 3. Progressive Steps in Appliance Construction. (Prepared and presented by members of the Orthodontic Staff of Columbia University, New York City, James C. Allan, Henry U. Barber, Jr., C. Sterling Conover, Edward G. Murphy, Frank E. Rians, and Donald Hutchinson.)

No. 4. Anatomical Exhibition of Bone Development as Result of Function. By Martin Dewey, New York City.

No. 5. Diagnosis With Particular Reference to Ages for Treatment, Showing Casts With Appliances Used. By Jos. D. Eby, New York City.

No. 6. Study of Infant Dentitions in Reference to Indications and Contraindications for Early Treatment. By Leonard M. Gunton, New York City.

No. 7. Demonstrating Importance of Molar Rotations Together With Rotating Devices. By Augustus B. Holt, New York City.

No. 8. Class II Cases. By Horace L. Howe, Boston, Mass.

No. 9. Influence on the Eruption of the Permanent Teeth by Orthodontic Development of the Deciduous Dentition. By Ashley E. Howes, New Rochelle, N. Y.

No. 10. Special Forms of Intermaxillary Elastic Attachments. By Andrew F. Jackson, Philadelphia, Pa.

No. 11. Surgical Orthodontic Correction of Malposed Centrals Due to Abnormal Frenum. (Motion Picture Film of Entire Technic.) By Victor Lay, Buffalo, N. Y.

No. 12. New York University Orthodontic Clinic Group.
University Clinic Records. By H. A. Denbo.
Lingual Arch Technic. By N. L. Hillier.
Indirect Molar Band Technic. By A. H. Lees.
Progressive Recording of Orthodontic Diagnosis and Treatment. By Agon Neustadt.

No. 13. Instrumentation With the Labial and Lingual Arches. By Herbert A. Pullen, Buffalo, N. Y.

No. 14. Retention of Distal Occlusions. (a) By Hawley Retainer Affecting the Anterior Teeth. (b) By Distal Spur on Molar Bands Affecting Posterior Teeth. By Lowrie J. Porter, New York City.

No. 15. Radiographic Studies in Orthodontia. Demonstrating Absorptions, Profiles, etc. By Sidney E. Riesner, New York City.

No. 16. Establishing Methods for Definite Routine of Treatment. By Otto J. Sorenson, Greenwich, Connecticut.

No. 17. Efficient Application of Separating Ligatures. By Charles A. Spahn, Newark, N. J.

No. 18. On Unilateral Distal Occlusion.
A. Diagnostic Maps Made by Relating the Maps of Occlusion and Malocclusion to Show the Minimum Tooth Movement. (Theory Least Squares.)
B. Method of Designing Appliances to Perform the Movements Indicated on the Maps.
(a) Expansion of Lower Premolars on the Side of Normal Mesiodistal Relations.
(b) Lateral Movement of Lower Incisors Toward the Normal Side. (Correcting Midline.)
(c) Forward Movement of Lower Molar on Side of Distal Occlusion.

No. 19. The Utilization of Developmental Tendencies in Orthodontic Treatment. By Alexander Sved, New York City.

No. 20. Developmental Anomalies of the Jaws and Teeth. By Leuman M. Waugh, New York City.

Not Classified

A Fixed and Removable Orthodontic Appliance. By Leo M. Shanley, St. Louis, Missouri.

American Dental Association

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The Dental Society of the State of New York

Preliminary Program

The 60th Annual Meeting of the Dental Society of the State of New York will be held at the Hotel Syracuse, Syracuse, N. Y., on May 16, 17, and 18, 1928.

Literary exercises, clinics, exhibits, etc., will be held at the Hotel Syracuse. Dr. Daniel Jutton, 405 E. Fayette Street, Syracuse, N. Y., is chairman of the Exhibits Committee. Dr. I. J. Silverman, 541 E. Genessee Street, Syracuse, N. Y., is chairman of the Clinic Committee.

The Executive Council will convene, for the transactions of the business of the Society, on Tuesday, May 15th, at 3:00 P.M.

Essayists.—Dr. Edward C. Kirk, Philadelphia, Pa.; Dr. Chalmers J. Lyons, Ann Arbor, Mich.; Dr. William E. Harper, Chicago, Ill.; Dr. R. H. Volland, Iowa City, Iowa; Dr. M. M. House, Whittier, Calif.; Dr. Edward Kennedy, New York City.

During the time of the meeting, sessions of the New York State Dental Hygienists Association and the Dental Assistants Association will be held.

Headquarters will be at the Hotel Syracuse and reservations should be made direct with the hotel management. For further information apply to the Secretary.

Dr. A. P. Burkhart, Secretary,
57 E. Genessee Street,
Auburn, N. Y.

The Eastern Association of Graduates of the Angle School of Orthodontia

The annual meeting will be held at the Hotel Vanderbilt, Park Avenue and 34th Street, New York City, on Monday and Tuesday, May 14 and 15, 1928.

Dr. E. Santley Butler, Secretary,
576 Fifth Avenue,
New York City

Iowa State Dental Society

The Sixty-sixth Annual Meeting of the Iowa State Dental Society will be held in Des Moines, May 1, 2, and 3, 1928.

John Scholten, Secretary,
Cedar Rapids, Iowa

American Dental Assistants Association

The Fourth Annual Meeting of the American Dental Assistants Association will be held in Minneapolis, Minn., August 21, 22, and 23, 1928. General headquarters will be at the Leamington Hotel.

Ruth F. Rogers, Secretary,
Suite 1760, 16 N. Wabash Avenue,
Chicago, Ill.

Board of Dental Examiners of Alabama

The Board of Dental Examiners of Alabama will hold regular theoretical and clinical examination in Birmingham, Ala., commencing Monday, June 25th, 1928, at 9:00 o'clock. For further information address E. W. Patton, Sec.-Treas., 725 First Natl. Bank Bldg., Birmingham, Ala.

Notes of Interest

Dr. F. Nicolai announces the removal of his office from 42 Livingston Street to 142 Joralemon Street, Medical Arts Building, Brooklyn, N. Y. Practice limited to orthodontia.